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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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CONVERSATIONAL SCIENCE LESSONS.

BY DR. ROBERT STEELE, B.SC., F.C.S.

LESSON XVI.—A PRISM.

Summary.—White light is made up of light of many colours. Coloured glass allows light of its own colour only to pass through it.

Materials.—Large sheet of white paper. A prism. Slips of common ruby and cobalt glass. (This lesson requires sunlight in the room. The prism should be 1½" broad, and moderately long, but one from a 'lustre' will serve. Most blue glass allows red light to pass through.)

Introduction.—Question as to sources of light. Get names of sun, candle, lamp, &c. What is the difference in strength of these lights? Which is the brightest? Arrange them in order of brightness. Probably all named by the class will be white lights; direct their thoughts to coloured lights, and get instances of such, as the red and green lights on a railway signal or a tramcar. Question the class as to how these lights are produced, and if possible bring out that they are produced by putting a slip of coloured glass before a white light.

I. Set up the sheet of white paper so that the sunlight falls on it. Hold a slip of window glass so that part of the paper is illuminated by light passing through it. The class will notice that light passes through the glass, that it is transparent. Has *all* the light passed through? Is the paper equally bright all over? Not quite. Write on the board:—'Window glass allows nearly all the light to pass through it.'

II. Hold the slip of ruby glass before the paper. Question in the same way. Elicit that some light passes through the glass, but that the red patch is not so bright as the part of the paper on which the sun is shining directly. Bring out that this means that 'the red glass stops some of the light, and allows some of it to go through.' Write that on the board.

III. Repeat the experiment with the cobalt glass, getting the same results.

IV. Hold the prism (with one of its long faces uppermost) in the sunlight, and move it until the coloured band of light, the spectrum, is thrown on the paper. (By moving it about, a place can be obtained where the sun is not shining on the paper, and where the spectrum can be seen by all the class.) Show that the prism causes the spectrum, by covering it up and thus cutting off the spectrum, or by moving it. Let the children name the chief colours. They will generally give red, green, and blue. Point out the orange and yellow between the red and green. Write on the board, 'Sunlight can be broken up into different coloured lights.'

V. All these lights are in ordinary sunlight. Hold the ruby glass between the prism and the spectrum. The red light alone passes through the glass. Hold the cobalt glass up. The blue light passes through. Hold the window glass up. All the colours pass through. Write on the board, 'Coloured glass allows light of its own colour only to pass through it.'

Recapitulate.

LESSON XVII.—RED.

Summary.—Various exercises tending to develope the colour sense.

Materials.—Prism, red objects, assorted shades of coloured wools, match, tissue paper.

Introduction.—Recapitulate last lesson. White light is made up of different kinds of coloured lights. Get the names of the chief colours. See that they are given in the right order:—Red, orange, yellow, green, blue, violet. Move the prism about in all directions, and show that this order is always followed. The red is always at one end of the spectrum. Obtain from the class the names of a number of red things, one from each, for example.

I. The connection between redness and heat. When we heat a poker in the fire, its colour changes from black to red, it becomes 'red hot.' Bring out that at first it is dull red, then a bright red, then at last white hot. Take a match or wooden splinter, light it, blow out the flame. What colour is the end? Red. Touch the piece of tissue paper with the red end. It chars the paper. The redness here shows great heat.

BRITISH MUSEUM

Refer to lessons 9 and 10. A kettle is hot, but not so hot as the red hot poker. As the poker loses its heat, it loses its red colour.

II. The teacher should next bring out a classification of red colours as light red or deep red. Make two columns on the board and put each of the objects before named in its own column. This will lead the class to give various names of shades of red. Write these on the board as different kinds of red colours, *e.g.*, scarlet, pink, rose, carmine, magenta, cerise, cardinal, &c. Show how some of these are derived from nature, *e.g.*, rose red, cherry red, brick red, &c.

III. Blood has two shades of red. When a finger is cut the blood is dark red, but the lips are bright red. Inform the class that the red blood is seen because the skin is so thin. Let them hold up their hands to the light with the fingers close together. The red colour seen is the colour of the blood. This colour is light red.

IV. Show some skeins of mixed wools. Let some children pick out all the shades of red. Distinguish carefully from brown or orange.

Recapitulate.

Lesson XVIII.—Blue.

Summary.—As in Lesson XVII.

Materials.—Prism, blue objects, assorted skeins of coloured wools, crimson lake, and cobalt blue paints, three paint dishes and brushes.

Introduction.—Shortly recapitulate the lesson on the prism. Let the class give the names of the colours in their order. Point out that the blue end is at the other side of the spectrum from the red end. Obtain from each child the name of one blue object.

I. The teacher will now obtain from the children the distinction of two leading shades of blue—light blue and dark blue. A number of children should be called out one after another to select the blue threads from the mass of wools. The teacher should carefully put aside any violets or purples chosen. Any names of blue colours that the children can give should be put on the board, and an object of the colour shown if possible. Point out that, as in the case of red, many of the colours receive their names from objects, as sky, peacock, navy blues.

II. The teacher will now take any pieces of purple or violet wool that have been called blue, and hold them up beside a good specimen of blue, calling attention to the difference between them. Possibly some child may be able to see that they are too red. If so accept the answer, but whether or not, take a blue paint, mix it in the saucer, and paint a blue stripe on some white paper an inch wide or so. Do the same with some red, painting a stripe beside the first at some inches distance. In a third saucer put a quantity of blue paint and a little red. Mix thoroughly, and paint a stripe beside the blue. The colour will be violet. In another put a quantity of red and a little blue, the colour of the stripe will be purple. By varying the proportions of blue and red a number of colours intermediate can be obtained.

Recapitulate.

Lesson XIX.—Yellow.

Summary.—Various exercises tending to develope the colour sense.

Materials.—Prism, yellow objects (*e.g.*, gold, sulphur, brass, corn, straw, lemon, orange, &c.), skeins of coloured wools, crimson lake and gamboge paints, saucers, and paint-brushes.

Introduction.—Shortly recapitulate the preceding lessons. Take the names of the spectral colours in order; yellow is about the middle of the spectrum. Obtain from each child the name of one yellow substance.

I. Write on the board the names of these substances. Show your specimens. Bring out that they are not exactly the same colour, but that they may be all called yellow. Thus there are many different shades of yellow. Call out several children to pick out the yellow from the skeins. Let other children match them with the objects provided. Point out that the tints are named from the objects, *e.g.*, golden, lemon, straw-coloured, &c.

II. Refer to gold as a colour. Why is gold used as an ornament? Its brightness. Get class to name objects coloured with gold. Picture frames, book edges, letters, &c. Is gold always used for frames, &c.? No. Why? Because it is too dear. Get from the class another metal that shines like gold—brass. Show a specimen, and compare it with gold as to colour. Obtain the reason why brass is not as good as gold for colouring, *i.e.*, because it soon becomes dull, and requires polishing. Explain process of preparing gold for gilding—by hammering out thin plates of gold between thin membranes. It is then called gold leaf. When brass is beaten out it is called Dutch metal.

III. Refer to lemon and orange as colours. Both may be called yellow, but there is a great difference. Some of the class may see that the orange is redder than the lemon. Do not tell them this, but paint a stripe of yellow on some white paper; then mix a little red with the yellow, and paint another stripe; then mix more red and paint a third. In this way the class will see that as the yellow becomes redder it becomes orange. Paint a cross one beam red, and the cross beam yellow. Note the orange at the cross.

Recapitulate.

Lesson XX.—Paints and Colour.

Summary.—Some objects are naturally of the same colour throughout, some are coloured artificially on the surface—painted; some are coloured artificially throughout—dyed; some have no colour—colourless.

Materials.—Prism, skein of white wool or silk, 1d. packet of magenta dye, water, &c., gamboge, cobalt, and crimson paints, and brushes.

Introduction.—Question on sources of light. All our natural light comes from the sun. Sunlight is made up from light of many colours. The chief of these are red, yellow, blue, and violet. Let the class give names of objects of each colour. Some of these will be painted objects. Bring out this distinction from the class. Refer to a lemon, naturally a different colour inside and out, and to a painted box, where the difference is caused by paints.

I.—Question as to what the class knows of paints. We have used paints in former lessons. Did we use them dry? No. How then? Mixed with water. These paints are called then 'water colour' paints. When a man is painting a door, what are his paints mixed with? Oil. Then there are two kinds of paints—oil colours and water colours. Refer to painting a door, show how painter paints it two or three times, each time he gives it 'a coat of paint.' Refer to cleaning off paint. Show that 'a thin covering of paint is put on when anything is painted.' Write this on the board.

II.—When we want to change the colour of cloth we do not paint it. Get the reasons of this from the children, *e.g.*, it would make the cloth stiff, the colour would be uneven, &c. Hence we use a kind of paint which colours each fibre altogether. This is called dyeing. Take a small quantity of magenta on the blade of a knife. Stir it up in half a tumbler of water with a few drops of spirit. Dip in half the skein of wool. It becomes a bright red. Squeeze it dry in a duster, then dip it in some clean water. The colour does not come out. It is a 'fast' colour. Explain why 'fast'—because the colour holds fast to the material.

III.—Question on the colours of surrounding objects. What is the colour of a glass of water? Some will probably say 'white.' Refer to any white objects near. Get the answer that it has no colour. Get the names of other substances that have no colour, are colourless. Glass, air, &c.

IV.—Recapitulate the facts already known about the mixture of paints.

Red and blue paints make purple paint.

Red and yellow paints make orange paint.

Mix some blue and yellow paints in a saucer, paint a stripe of the mixed paints between one of yellow and one of blue. The class will see that it is green.

Blue and yellow paints make green paint.

Write these three results on the board.

Recapitulate.

DECORATIVE NEEDLEWORK.

BY MAY MORRIS.

III.—Embroidery Stitches—*(Continued)*.

Satin-stitch can be done in the hand or in a frame. It consists of stitches evenly laid in one direction, the needle passing under and over the space to be covered, back and front being similar. The stitch can be worked flat and simply in fine twisted silk, or linen thread, or as the Chinese and Japanese employ it, in floss silk finely divided; and with any of these materials makes very dainty decoration. You will have seen somewhere, doubtless, work of this description on some treasured antique garment, a great-great-grandmother's wedding-gown, or a gorgeous satin waistcoat of preposterous length, worn in times when dress was stiff and gaudy rather than tasteful, but picturesque for all that. On such garments you may see little flowered borders worked with the utmost refinement and patience in chain or satin stitch, the finest imaginable twisted silk being used, the colours even now both bright and delicate, and chosen of the gayest and most fanciful combinations. Look well at such work when it next comes across your path, and you will see what time, patience, and skill can do. To my thinking, satin-stitch is rather clumsy when worked with thick silk or

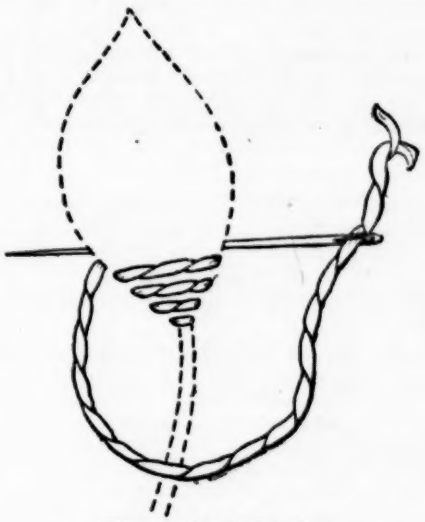

Fig. 1.—Satin Stitch.

wool. It is obvious that the space to be covered by the needle must not be very broad, for then the characteristic compact and close surface is lost, and the stitches lie loosely in untidy loops; it will be found inexpedient and clumsy to work in short stitches with thick materials, hence it is best to leave this stitch for the finer sorts of work. Another and an effective method of using the stitch consists in first embossing or 'stuffing' the form to be covered, which is done by laying threads of coarse cotton or linen thread backwards and forwards and fastening them down, and when raised so that the required relief is obtained, the satin-stitch is worked over, at right angles to the direction of the layers of stuffing. For any articles that are expected to receive hard wear this is an excellent and enduring method of work; but as it is inclined to have a hard and mechanical look (particularly if it is very smoothly done), the relief should be mostly rather flat and low. What I describe here is a comparatively simple form of relief; but presently, in discussing more complicated stitches, I shall have to show that modelling can be elaborated almost indefinitely.

Stem-stitch is so simple that it almost explains itself

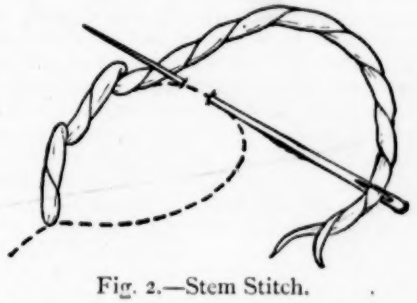

Fig. 2.—Stem Stitch.

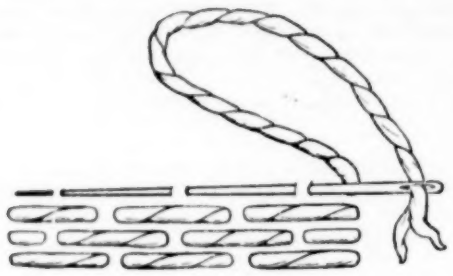

Fig. 3.

by diagram. One stitch is laid beyond another in a continuous line which should be smooth and even, the thread being always kept on the same side of the needle. This is essentially adapted to work done in the hand; it is useful for filling stems and putting in outlines.

Darning can be variously treated, the principle of the stitch being given in Fig. 3, where the threads are shown laid in horizontal lines. (*a*) The needle is run in and out of the material, following the threads of it, sometimes both right and wrong side alike, and, indeed, resembling the woven stuff. It is used in this way on many of the Eastern embroidered towels that are so much used now. So treated, the stitch has little artistic value in itself, for with weaving the same decoration could be obtained; it is merely a substitute for weaving used for decoration of their cloths and towels by people who might not care to set up a loom for so slight a purpose.

(*b*) Another form of darning is, on the contrary, rather elaborate, and involves artistic knowledge in drawing lines and in shading colours. The needle follows the curves and forms of the design, the full stitch only showing on the upper surface of the material. The stitches also radiate outward from a common centre (see Fig. 4). The beginner will encounter several difficulties from the outset, and much more can be learnt by a few hours of personal instruction than by many pages of careful description. When a mass of one colour merely is required the task is fairly easy, great attention being paid to laying the threads in even lines from centre to edge of the leaf or flower. The stitch, however, is particularly suitable to shading and blending several colours, a skilful worker obtaining both delicacy and variety from this facility. But here is our first pause: for this very facility of shading with the needle constitutes in itself a pitfall to the unwary. It is so tempting to form nice little leaves and flower-petals, all painted up in 'natural' colours almost as good as a picture. But try it. Take a flower on its stem, or spray of leaves, use twenty or thirty different shades of colour to a square foot of work, each leaf executed with its browns, and pinks, and greens, with high light, and lights diffused and reflected, all dragged in by main force, till a libellous caricature of natural growth is achieved; a caricature having less semblance to the real thing than the fearless images with a blunt pencil done by a child, whose drawings are *symbols* of what his eyes see, and have a value all their own as a natural and unaffected expression of natural facts. Then work the same spray in flat and simple colours, say in two shades at most for a leaf, either one side of the leaf light and the other dark, or both sides shaded up from dark to light colour, or the reverse; flower-petals treated in the same way with very light shading, and with a firm outline to render the pattern clear. Compare the two methods of work, and a little thought will show you that the latter way of working has a more pleasing look than the former, which is a laborious, pretentious effort to imitate nature in her own colours. A broad and simple style of work should be practised for a long time, and until you have thorough command over colour and composition, and a very sure and definite experience of the value of *harmony* and *contrast* and such-like technicalities akin to the painter's art.

Darning, then, is worked in the hand on some loose soft material, and the more yielding the fabric, the quicker the work goes, if that is an advantage. It is not a stitch that will last for ever, the threads all lying on the surface, rather long and loose. Thus it is not suitable for ornamenting surfaces that receive much friction, nor for anything that is easily soiled and has to be constantly refreshed or cleaned. It is a good method for quickly and economically covering large surfaces, but unsuited to important works that are to be durable as well as beautiful.

Another look at Fig. 4, which represents a stem and leaf filled in with work, will show roughly the direction in which the stitches ought to lie. It is absolutely

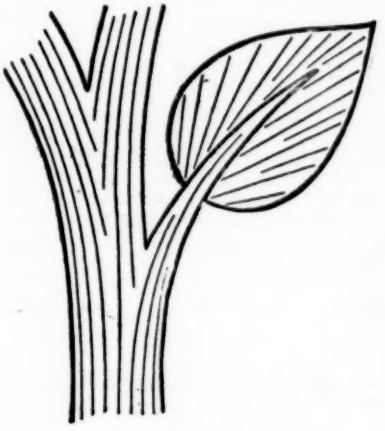

Fig. 4.—Darning.

necessary to pay strict attention to this, for correct laying of stitches is one of the first principles of embroidery, and of every sort of needlework, plain or ornamental. The slight radiation of the lines in this leaf

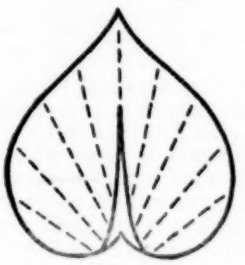

Fig. 5.

falling outwards from a centre should also be noticed. In filling solidly an ornamental form of any breadth, the beginner who ponders over her work will consider how her threads shall be laid so as to fill the space harmoniously, giving at the same time an even texture. She will soon find that the only way to do this is to work from a centre, whence the stitches fall right and left, joining imperceptibly at the top (see Fig. 5), such designs as the embroideress makes use of almost always lending themselves to, and suggesting such treatment. These observations apply equally, of course, to all stitches used for filling solid masses.

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THE PLANET JUPITER.

BY R. A. GREGORY, F.R.A.S.

Honours Medallist in Physiography. Author of 'Physical and Astronomical Geography.'

ALL who possess the faculty of observation must have noticed the brilliant object now so conspicuously visible in the evening sky, and due south about 8 p.m., and many have doubtless identified it as the planet Jupiter. A few words relating to this body should be of particular interest to candidates who intend presenting themselves for the Training College examination in Advanced Physiography next December, for questions requiring brief descriptions of the principal planets are often given.

Jupiter is the largest of the planets, its bulk being about one and a half times greater than all the rest put together. It circles round the sun at an average distance of 483,000,000 miles, that is, in an orbit having a diameter a little more than five times greater than the path of the earth. The eccentricity of Jupiter's orbit is ·0482, whilst that of the earth's orbit is only ·0167. On account of this very definite departure from a circle the actual distance of Jupiter from the sun varies a little more than 21,000,000 miles on each side of the mean distance. The orbital velocity of the earth is eighteen miles per second, whilst Jupiter only accomplishes eight miles in the same time. In consequence of this slower rate of motion and increased length of path, the planet takes 4,332·6 days or 11·86 years to make a circuit of the heavens, but only 399 days to make a synodic revolution, that is, to pass from opposition to opposition, as seen from the earth.

The polar diameter of Jupiter has a length of 83,000 miles, whilst the equatorial diameter is 88,200 miles, a difference from which an oblateness or ellipticity of $\frac{1}{17}$ is derived, whilst that of the earth is only $\frac{1}{294}$. The mean diameter is 85,600 miles. From this we see that eleven earths in a line would just about stretch from one side of this stupendous globe to the other. The disproportion between the two Jovian diameters is a feature easily observed. Utilising the measurements given above, it may be found by calculation that the surface of Jupiter is 119 times greater than the area of the earth. And the volume is 1,300 times greater; in other words, 1,300 globes having the same bulk as the earth would be required to form one body as large as Jupiter. If the materials of which Jupiter is composed were in the same condition as those which make up the earth, it is evident that this planet should be approximately 1,300 times heavier than the earth. But this is not so. Were it possible to place Jupiter in one scale-pan of a balance and weigh it against the earth we should find that about 316 earths would be necessary to counterpoise it. In other words, if the earth in its present condition were as large as Jupiter it would be four times heavier. The mean density of Jupiter is therefore one-fourth that of the earth; in fact, it is very nearly equal to the density of the sun, and a little greater than the density of water.

And yet, in spite of this low density, Jupiter has a mass so great that twice the mass of all the other planets put together is hardly equal to it. The mass of Jupiter is known with a greater degree of accuracy than that of any other planet. It has been determined, from observations of the motions of each of the four satellites which circle round him; and from observations of his perturbing effect upon the paths of some of the minor planets which circle between him and Mars, and the comets which come within his sphere of attraction.

In even a small telescope this ponderous body is a fine object to observe, and with a large instrument he is seen to be traversed with belts of cloud above and below his equator, and more or less parallel to it, and covered with numerous delicately tinted spots and markings. A red-coloured spot appeared on the planet about thirteen years ago, and has been observed as a very striking object ever since. It was noticed as a remarkable feature in July, 1878, but most probably existed as a less conspicuous object long before. It is constantly elliptical in outline, but has exhibited various changes of colours, from brick-red to a light tint differing very little from the surrounding portions of the planet's disc. At the present time the 'great red spot' is well defined and fairly visible. The spot is doubtless a depression in the planet's atmosphere, for at times layers of cloud overlap and partially obliterate it.

When the belts are observed for an hour or so they and the spots and various markings may be seen to change their position on the visible disc. The portions of the belts near one edge of the planet at the commencement of the observations will have disappeared, and new features will have appeared at the opposite edge. By observations of the rate of movement of particular spots, it is found that the planet is in rapid rotation, and whirls completely round on his axis in a little less than ten hours. When we consider that in consequence of the earth's axial rotation a point on the equator has a velocity of 1,000 miles an hour, and that Jupiter's diameter is eleven times longer than the earth's, it follows that a point on the Jovian equator possesses a velocity twenty-seven times greater than one similarly situated on the earth. It is on account of the high centrifugal force thus called into play that the oblateness of the planet is so considerable.

The intensity of the sun's heat received by Jupiter is only $\frac{1}{27}$ of that intercepted by the earth. This amount is quite insufficient to produce the cloud-belts, or cause the swift transformations which are often observed in them and other markings. There is, therefore, little doubt but that Jupiter emits a certain amount of light and heat of his own, in addition to the reflected sun-light of which his luminosity mainly consists. This

idea also finds support in the low density of the planet and his rapidity of rotation. The probability is that our giant planet is nothing more than a globe of fluid, overlaid by the dense clouds above described. It is not self-luminous to any appreciable extent, for its spectrum differs very little from that of reflected sunlight. Countless ages ago the earth must have been in the same heated and semi-gaseous condition as Jupiter is now; but owing to its being much smaller it has cooled down quicker. In the distant future the mighty orb will condense to the condition of the earth, and our globe itself will then roll through space a cold and arid rock, like the moon.

The retinue of four satellites possessed by Jupiter circle round him at distances ranging between 261,000 and 1,167,000 miles in periods contained between forty-two hours and sixteen and two-third days. The diameter of the third in order of distance from the planet is 3,600 miles, whilst the three others range between 2,100 and 2,900 miles. Galileo discovered these bodies in 1610 with the telescope invented by him, and they may be easily seen by means of a field-glass. Observations of the Jovian system gave great support to the Copernican theory, and were the means of overthrowing the idea that the earth was the centre of the universe, and all the heavenly bodies were subservient to it.

These few facts are sufficient to indicate the astronomical and historical interest which attaches to Jupiter, and they are especially opportune, because the planet is now more favourably situated than it has been for some years. The following is a summary of the elements referred to in the above :—

Eccentricity of Orbit	...	·0482
Mean Distance from the Sun	...	483,000,000 miles
Sidereal Period	...	4,332·6 days
Synodic	...	399 days
Inclination of Orbit	...	1° 18′ 41″
Oblateness	...	$\frac{1}{17}$
Mean Diameter	...	85,600 miles
Volume compared with the Earth	...	1,309
Mass " "	...	316
Mass " " Sun	...	$\frac{1}{1047}$
Density " " Earth	...	0·24
Density " " Water	...	1·33
Time of Axial Rotation	...	9hrs. 55min.
Number of Satellites	...	4

WELL-KNOWN TEACHERS AT WORK.

I.—MR. ABR. PARK, J.P., *Albion Schools, Ashton-under-Lyne.*

THE subject of our present sketch has attained to such a position in the teaching profession, and, in the North of England at least, is so widely known, that we believe our readers will be interested in learning something of his experience and work. Few men have done more in their own neighbourhood than Mr. Park has done in attempting to raise the social status of the school-teacher. This has, indeed, been his constant aim from the time when he himself began to achieve success; and by his ceaseless energy, by his literary ability, and by his personal example and influence he has produced a marked effect upon his co-workers around him.

'Blessed is the country that has no history!' it has been said, and whether this be true or not, it is a decided blessing for a voluntary school to have one, as it tends to keep alive the interest and zeal of its supporters. And though the Albion Schools are still in the full vigour of youth, and can scarcely be said to possess a history beyond a continued record of progress, they are closely allied to the Albion Independent Chapel, which has an interesting history of its own. Concerning this, nothing more need be said than that it is the old story of an up-hill fight against bigotry and intolerance. By the people of Ashton and neighbourhood the chapel and schools are collectively spoken of as 'The Albion,' and this name is held in affectionate regard by all who are or have been connected with the place. The recollection of their past struggles, together with the fact that this neighbourhood strongly asserts its claim to have been the birthplace of Independency, may to some extent account for the enthusiasm and liberality of the people at 'The Albion.'

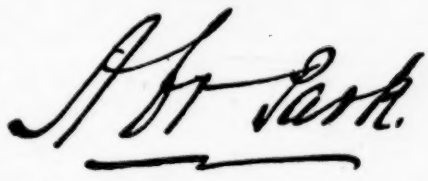
The original Sunday School in connection with Albion Chapel was built about seventy years ago, and now does duty as a Science School, concerning which we shall have more to say hereafter. The more modern building was erected in 1862 (also for Sunday School purposes) about a hundred yards from its predecessor, but it was not until 1869 that it was opened as a Day School upon purely unsectarian principles.

It stands alone on a triangular plot of rising ground. The exterior is faced with red brick, relieved by white fire brick, and is somewhat Italian in style. The building is surmounted by a square tower, which as an extraction shaft carries off the foul air from within. Care has been taken to admit a supply of fresh air by ventilating valves in each window, and in cold weather a supply of hot air is maintained by Haden's heating apparatus. The whole erection is admirably contrived to secure health and comfort both to teachers and scholars. From the front of the building there are two entrances, each leading to a wide corridor at the end of which there is an open staircase. In each case the corridor and staircase extend throughout the breadth of the building to another doorway in the rear. The corridors have on one side a series of class-rooms, and between them there is a Lecture Room in the form of an amphitheatre, which is a model of comfort and elegance. Ascending one of the flights of stairs we come to the Great Room, which occupies the whole length and breadth of the main building, and presents a very imposing appearance. This room is 100 feet by 50, exclusive of recesses, and 25 feet high to the tie-beams, while in the centre it measures 35 feet high to the roof. It provides accommodation for 1,000 scholars, and is, perhaps, the largest room in any day school in the country. The eastern wing of the building comprises the Infant Room on the ground floor, and a large class-room above. All the rooms are tastefully fitted up, and to anyone who has seen the building it will be a matter of no surprise to learn that it cost £11,000.

Mr. Park has been headmaster of this institution since its opening in 1869. He received his education latterly at the Glasgow University, and after making a somewhat humble beginning as a tutor and dominie of a Highland school, he was appointed headmaster of Langbank Public Seminary on the Firth of Clyde.

It was not, however, until he came to Ashton that he found sufficient scope for that insatiable energy which has succeeded in placing the Albion Schools in the front rank of the voluntary schools of this country. In 1866 he became a Fellow of the Educational Institute of Scotland, and in 1874 he was elected a Fellow of the Royal Geographical Society. He has written a number of school treatises, and is a regular contributor to our educational literature. Of late years he has taken considerable interest in local politics, and has a seat as a Radical in the Town Council, besides being a magistrate for the borough. In our interview with him we ventured to broach this subject.

'Now, Mr. Park, it is not for a moment to be supposed that you allow your duties as councillor and magistrate to interfere with your professional work. Your schools are unsectarian, and therefore it might be presumed that you could draw your scholars from all sects and parties; but seeing that you are a politician, one might suppose that those who are not of your party would refuse to trust their children to your care. Does this not impair the usefulness of your schools?'



'I am confident that it does not do so in the least. My staff has always been composed of members of various religious denominations; many of them have belonged to the Church of England, and have probably imbibed Conservative opinions. In making an appointment these matters are not taken into consideration. And though my own political opinions are strong, I hold the most cordial relations with the Conservatives of the town, and I believe they heartily appreciate the work we are doing here. Indeed, it was only the other day that a Tory Alderman said to me: "There is no doubt about it that if the Albion Schools did nothing else, they stir up the other schools to work; sometimes it may be in a way they find objectionable, but in the end the public reap the benefit." But the petty squabbles which so frequently crop up in the council are very distasteful to me, and I would certainly keep out of it altogether were it not that I think I can be of service to the Free Library and Technical School, which are being erected in the borough at a cost of £20,000.'

'And in giving your advice and experience in establishing the Technical School, are you not likely to be doing yourself an injury? Don't you think they may flourish at the expense of your own Science School?'

'Oh! not at all. The Technical classes will be held in the evening, and as we make no effort to develop our Evening Classes there will be no rivalry between us.'

'You speak of your larger school as a Higher Grade School, though it includes all the standards. Do you think the name is strictly applicable?'

'Well, I must confess I do not myself altogether like the name, and I would have hesitated to adopt it but for two reasons—firstly, it serves to distinguish it from the Science School, and secondly, it seems as good a name as any for singling out those schools which will not in future be Free Schools.'

'I gather from this that your schools like a good many others here in the north, will not be absolutely free. What is your opinion about the working of this last Education Act?'

'I am an advocate for free education, but I regret extremely that the Free Education Act cannot provide the means for securing this desirable boon to schools of a higher grade like the Albion. To give free education in the Albion Schools under the provisions of this Act would entail a loss of about £400, and as the managers cannot be expected to find this sum, it would necessitate a reduction of the school staff, both in number and in quality, and bring the school down to a much lower standing. If we cease to maintain the quality of our instruction, and if we cannot have a better class of children, our Science School cannot be fed and the Mason Scholarship must be discontinued. I do not look upon this Act as in any way final. There is no doubt in my mind that it is the beginning of the end, so far as voluntary schools are concerned, and that their total extinction is within measurable distance. In the meantime this Act puts it in the power of a political educationist—by no means a blessing in any neighbourhood—to get up an agitation for free places without having the slightest appreciation of the principles of education. We have too many of this class who preach and lecture about the *rights* of what they call the "working classes," but who never refer to the *responsibilities* and duties of these classes. I do desire a greater personal interest on the part of the parent, and I trust that free education will not destroy this.'

'What plan do your managers intend to adopt for the supply of Free places?'

'We intend to give the public the advantages of the Free Education Act at once. About half a mile distant we have a branch school in Charlestown, one of the poorest quarters of the town. This school, associated under one management with the Albion, will be absolutely free; while our fees in the Higher Grade

School here will be reduced all round, *pro ratâ* in the different standards. But the reduction of fees in the Albion School will not be so great as it otherwise would be if Charlestown were not made entirely free. To put it simply, the managers lose less at the Albion from the fact that they lose all at Charlestown. Such a plan, of course, can only be adopted where schools are associated. In other schools where Free places and fee-paying places exist side by side, I foresee a vast amount of trouble, both to the managers and to the Education Department. In our own case, the Charlestown School may be overwhelmed with applications, and I suppose the further supply of Free places must be considered by the School Board.'

'Have you any half-timers in your school?'

'We have a few, but their number is so small that we cannot adapt our time-table to suit them, and they suffer in consequence. My managers have from the very first been anxious that the children of the poorest classes might be able to avail themselves of whatever advantages we could offer them here. In this connection, indeed, we have received honourable mention in the Blue Book of 1879. Here is the extract I refer to. It is from the Report of the Rev. J. Lomax, H.M.I. of Schools:—

'"There is no school in my district which ranks higher in point of numbers and efficiency than the Albion Schools. Not only are the ordinary subjects thoroughly well taught, but the curriculum in the upper classes is as extended in its range as that which might be found in any well-conducted middle-class school. To the credit of the managers and of the head master, I may add that the attendance of half-timers is not only not discouraged, but welcomed, their great aim and object being to afford to all comers, but especially to the children of the poor, an opportunity of rising, through an advanced education, to positions of eminence in after-life. For this purpose the Albion Scholarships were established—to which I alluded in my last report—and in 1875 Mr. Hugh Mason generously added yet another to his many benefactions to the school by founding a scholarship of the annual value of £50, the conditions attached to it being, that the 'Mason Scholar' shall proceed to one of our universities or to Owen's College, Manchester. The obvious inquiry here presents itself. What has been the result of all this educational effort on the part of the authorities of this school? and the answer is both hopeful and encouraging. During the ten years of its existence 7,865 scholars have been admitted to the day classes, 3,241 to the elementary evening classes, and 783 to the science and art classes, making a total of 11,889. Thirty-seven young people, who have either passed their apprenticeship or served as assistants in this school, are now at work as certificated teachers in different parts of the country. Three of the scholars have matriculated at the University of London—one has passed his first B.A. examination, and another is an undergraduate at Cambridge—three are practising as solicitors, and one as Assistant Medical Officer of Health for the City of Edinburgh."'

'Of course this is an old report, and the figures are now far below the facts. But to return to the question of half-timers, I may say that many of them will now probably be drafted off to the Charlestown branch school, where they will receive free education, and have a curriculum specially adapted to their wants. In the passing of the Factory Act this session Mr. Matthews made the astounding statement that half-timers were quite equal to full-timers in their attainments. I have found this far from being the case, and it is absurd to suppose that children with wearied bodies and impaired physique, whose interests are mainly occupied with the novelty of their mill work, should be able to acquire as much information in half the time that other children require who are in more favoured circumstances.'

'You have spoken of the liberality of your managers. It must surely be of the most disinterested kind, since no part of your time in school hours is set apart for teaching a particular form of creed or doctrine.'

'My managers are the most liberal-minded people that ever a school was blest with. I have all along had *carte blanche* in the working of the school, and have met with nothing but the greatest kindness at their hands. Of voluntary subscriptions strictly speaking we now have little or none, and hence we make a sorry appearance in the Returns just issued under this head. But no subscriptions are needed, as the school is now absolutely self-supporting. However, a sum of £76 is raised yearly, and is distributed in the form of scholarships. I venture to think that few, if any, voluntary schools in the country can boast a similar sum for that purpose. Here is a list of these scholarships:—

'1. One "Albion" Scholarship, value of £5, for English, to be competed for by those who are in the sixth standard, and who have attended these schools for not less than one year.

'2. One "Albion" Scholarship, value of £5, for English and Special Subjects, to be competed for by those who have passed the sixth standard in these schools.

'3. One Arts Scholarship, value £3.
'4. One Music Scholarship, value £3.
'5. One Science Scholarship, value £5, for the students of the Evening Science Classes.
'6. One Arts Scholarship, value £5, for students in the Evening Art Classes.
'7. The "Mason" Scholarship, annual value £50, for two years, tenable at one of the Universities.

'And in addition to these, my managers have offered for competition among the elementary schools of the district twelve scholarships entitling the winners to Free Education for one year in the Science School.'

'On completing their apprenticeship do your teachers, as a rule, go to the Training Colleges?'

'I have trained about 150 teachers, who are now certificated and engaged in professional work all over England and Wales; but very few of them have passed through college. I have always maintained that the Training Colleges do not give proper encouragement to the higher forms of instruction in classics and mental philosophy, and I have therefore never encouraged the best of our pupil-teachers to enter them. To young teachers who have had limited experience of school management and who come from small schools I am certain that the Training Colleges are very beneficial; but I am convinced that the Day Training Colleges affiliated to Owen's College, King's College, etc., are a solution of the whole question. I believe that the admixture of young teachers with those preparing for other kinds of professional work must be of great value to Queen's Scholars.'

In Mr. Park's company a visit was then paid to the Science School, which, as we have said, is conducted in the old school quite close at hand. It can boast of being the only one in connection with a voluntary school in the country. As might be expected, this building is not fitted up with the same degree of elegance as the Higher Grade School, but considerable expense has been incurred in adapting it to the teaching of science. There is a main room, a laboratory, and two class-rooms, which are all convenient and comfortable; and there is an abundant supply of necessary apparatus. We found about a hundred scholars at work, and there is ample accommodation for more than twice that number. In response to our inquiry, Mr. Park described how this school had originated.

'For a number of years before we began here, we had carried on science classes in the Higher Grade School as part of the ordinary work there, but I felt that these classes were not meeting with the success which might be expected under more favourable conditions. It was Mr. Buckmaster, H.M.I. of Science Schools, who first gave me the idea of forming these classes into a separate organised science school. At the same time he gave me such information as to how it might be worked, that I strongly advised my managers to try the scheme. This was in 1887.'

'And what success did you meet with at first?'

'The number of students we registered during the first year was eighteen—a very small number, and, considering the expenses involved, the experiment at this juncture seemed rather a dubious one. Fortunately, however, our staff expenses were small, as some of the certificated teachers from the Higher Grade School were qualified to teach the subjects required. At the end of the year the successes of the scholars at the science examinations were such that we felt justified in continuing the experiment. The second year we began with thirty-two students, and it became necessary to appoint a science master who would be able to devote the whole of his time to the work. Mr. Morris, one of the school staff, was fully qualified to give instruction in all the subjects required by the Science and Art Department's regulations, and on my recommendation he was appointed master. The real commencement of the school dates from this period.'

'Your numbers seem to have greatly increased since then, and it seems rather surprising that you are able to find a sufficient number of science scholars in Ashton?'

'For that matter, I should say that many of our older scholars come from a distance, a goodly number by train. The upper standards in our Higher Grade school are to a considerable extent fed from the outside, as many scholars come to us at such an age that we cannot well put them in the lower standards. This accounts for the fact that our sixth standard there is so unusually large—about 16 per cent. of the total number in standards. According to the Blue Book the average for the whole country is about 4 per cent. As soon as they have passed the sixth standard we do not encourage them to remain in the Higher Grade School, but transfer them to the Science School.'

'Will you please give some details concerning the successes of your scholars here?'

'At the May examination for the last two years our achievements I consider quite wonderful, and indeed it was this which led to the Technical Education movement in this town, and which probably led to my appointment by the Town Council as Hon. Secretary and Correspondent of the Technical School. During the past year, out of sixty students 117 first-class certificates have been obtained, and 190 second-class certificates, giving an average of two first and three second-class certificates for each student.'

'How do the girls compare with the boys?'

'I think very well, except perhaps in mathematics. Last year the highest individual success was attained by a girl, who earned six first-class certificates and one pass certificate, the pass certificate being the highest awarded for that subject. Of course, in this connection, it must be remembered that the girls are much fewer in number than the boys.'

'Do you allow the scholars to select their own subjects?"

'Oh! by no means. We have a regular scheme adapted to a three years' course of study, which we expect everyone to follow out, and only in exceptional cases is it departed from. Here it is:—

FIRST YEAR.

ART.—Freehand, Geometrical Drawing.
SCIENCE.—Mathematics (Stage 1), Physiology (Stage 1), Magnetism and Electricity (Stage 1), Theoretical Chemistry (Stage 1), Practical Chemistry (Stage 1).
LANGUAGES.—English, French, Latin.
MINOR SUBJECTS.—Music (Vocal), Drill, Handwriting.

SECOND YEAR.

ART.—Sketch Drawing, Model, Perspective.
SCIENCE.—Mathematics, Physiology, Magnetism and Electricity, Theoretical Chemistry, Practical

ALBION INDEPENDENT EDUCATIONAL INSTITUTE—TIME TABLE.

No. 1 (HIGHER GRADE ELEMENTARY SCHOOL).

(THE STANDARDS.)

	9-9.10.	9.10—9.50.	A.M. 9.50-10.5	10.5—10.55.	10.55-11.5	11.5—11.50.	11.50-12	12-1.30	1.30—1.50.	1.50-2	P.M. 2—2.55.	2.55-3.5	3.5—3.50.	3.50-4
MONDAY.	Devotional Exercises and Examination of Home Tasks.	I. Simultaneous Read. II. „ III. Reading. IV. „ V. Geography. VI. & VII. Arithmetic.	Marking of Registers; Change of Classes.	I. Reading. II. Writing. III. Dictation. IV. Spelling and Geog. V. Reading. VI. & VII. „	Change of Classes.	I. Spell., Writ., & Dic. II. Dictation & Spelling. III. Writing. IV. Arithmetic. V. „ VI. & VII. Geography.	Mental Arithmetic.	Interval for Dinner.	I. Reading. II. „ III. Writing. IV. Read. & Arith., alter. V. Reading. VI & VII. Arithmetic.	Marking of Registers.	I. Spling., Dictn., Tbles. II Read., Gram., etc. III. „ IV „ Spelling & Dict. V. Composition. VI & VII. G. Essay. B. Arith. & Gram.	Change of Classes.	I. Poetry and Arith. II. Arithmetic. III. „ IV. Arith. & Read., alter. V. Arithmetic. VI. & VII. B. Essay. G. Arith. & Gram.	Home Tasks Set—Devotional Exercises.
TUESDAY.		I. Simultan. Reading. II. „ „ III. Boys, Reading. Girls, Geog. & Rdg. IV. Reading. V. Geography. VI. & VII. Arithmetic.		I. Writing. II. Reading and Spellg. III. Dictation. IV. Spelling and Geog. V. Reading and Composition. VI. & VII. Writing.		I. Read., Spel., & Writ. II. Dictation. III. B. Arithmetic. G. Gram. & Geog. IV. Writing. V. Arithmetic. VI. & VII. Grammar.			I. Reading. II. Test Examination. III. Reading. IV. B. Reading. G. Sewing. V. „ VI. & VII. Arithmetic.		I. (Same as M'day) & II. Test Exam. [Geog. III. Reading & Gram. IV. B. „ „ „ G. Sewing. V. Composition. VI. & VII. B. Arith. & Rdg. G. Essay.		I. Poetry & Arith. II. Test Examination. III. Geog. & Arithmetic. IV. B. Geog. & Arith. G. Sewing. V. G. Specific Subs. B. Reading. VI. & VII. B. Essay. G. Specific Sub.	
WEDNESDAY.		I. Simultan. Reading. II. „ „ III. B. Reading. G. Gram. & Rdg. IV. Arithmetic. V. Geography. VI. & VII. Arithmetic.		I. Reading. II. Reading and Spellg III. Dictation. IV. Spelling and Dictation. V. Test Exam. VI. & VII. Geography.		I. Spell. Writ., & Dict. II. Dictation. III. B. Arithmetic. G. Geography. IV. Geography. V. Test Exam. VI. & VII. Reading.			I. Test Examination. II. Reading. III. B. Spelling. G. Sewing. IV. Read. & Arith., alter. V. Arithmetic. VI. & VII. Test Exam. or Arithmetic.		I. Test Examination. II. Gram., Geog., & Tbls. III. B. Grammar. G. Sewing. IV. Read., Spel., & Gram. V. Grammar. VI. & VII. Test Exam. or Arith. & Poetry.		I. Test Examination. II. Arithmetic. III. B. Geog. & Spec. S G. Sewing. IV. Arith. & Read., alter. V. Reading. VI. & VII. Test Exam. or Reading.	
THURSDAY.		I. Simultan. Reading II. „ „ III. Reading. IV. Test. Exam. V. „ VI. & VII. Arithmetic and Spec. Subs.		I. Reading. II. Reading and Spellg. III. Geog. (or Gram.) and Test Exam. IV. „ V. „ VI. & VII. Specific Subjects		I. Spell., Writ., & Dict. II. Dictation. III. Test Exam. IV. Writing Lesson. V. Arith. or Gram. VI. & VII. Reading.			I. Reading. II. B. Reading. G. Sewing. III. Spelling IV. Specific Subjects. V. G. Sewing. B. Reading. VI. & VII. G. Sewing. B. Spec. Subs.		I. (Same as Monday). II. B. („ „ Wed.). G. Sewing. III. B. Geo. & Spec. Sub. G. Arithmetic. IV. Specific Subjects. V. B. Arith.—G. Sewg. VI. & VII. B. Spec. Subs. G. Sewing.		I. Arithmetic. II. B. Arithmetic G. Sewing. III. B. Arithmetic. G. Geog. & Spec. S. IV. Specific Subjects. V. B. Spe. S.—G. Sewg. VI. & VII. B. Specific Subs. G. Sewing.	
FRIDAY.		I. Singing. II. „ III. Reading. IV. „ and Poetry. V. Geography. VI. & VII. Poetry and Grammar.		I. II. Specific Subjects. III. IV. Singing. V. VI. & VII. Specific Subs. or Composition.		I. Geography. II. Geog. and Poetry. III. Specific Subjects. IV. Grammar. V. VI. & VII. Singing.			1.30—1.40 Marking of Registers.	1.40—2. I. B. Recapitulation. G. Sewing. II. Tables. III. IV. Poetry. V. VI & VII. Specific Subs.	2—3. I. B. Recapitulation. G. Sewing. II. Geo., Grm. & Poetry III. Grammar. IV. Arithmetic. V. VI. & VII. Specific Subs.		3.0—3.30. I. B. Recapitulation. G. Sewing. II. Mental Arithmetic. III. Geography. IV. V. VI. VII. Specific Subs.	3.30-3.40

SPECIFIC SUBJECTS.

MON.	2 to 4 Daily.	Manual Instruction in Wood-work and use of Tools every afternoon.		Manual Instruction, &c.		Manual Instruction.			Manual Instruction.		V. VI. & VII. Selected G. & B. —Drill between	1.30 & 4.0.	Manual Instruction.	
TUES.											Manual Instruction.			
WED.													III. B. Drawing.	
THURS.				IV. Drawing. V. VI. & VII. Algebra (Selected).					IV. Drawing (all aft.). VI. & VII. Physiology (all afternoon).		III. Drawing.		III. Drawing. V. VI. & VII. Physiology.	
FRIDAY				I. & II. V. VI. & VII. Drawing.		III. Drawing.					V. VI. & VII. Drawing.			

Alternate THURSDAYS—Practical Cookery, Sick-nursing, and Ambulance Work 10.0—12.0, 1.30—4.30, and 7.0—9.0
Instruction given every afternoon to Selected Class of Boys in Wood-work and use of Tools in Manual School.

ALBION ORGANISED SCIENCE SCHOOL—TIME TABLE.

No. 2.—ADVANCED EX-STANDARD WORK.

SECOND YEAR.

	Morning.			Afternoon.		
	9–9.30.	9.30–10.40.	10.45–12 or 12.15.	1.30–2.30.	2.30–3.30.	3.30–4.	4–4.30.
Monday.	English.	Mathematics.	Magnetism and Electricity.	Chemical Arithmetic.	Mathematics.	Latin.	Book-keeping.
Tuesday.	Latin.	Chemistry (Theory).	Chemistry (Practical).	English.	Animal Physiology.	French.	Shorthand.
Wednesday.	French.	Animal Physiology.	P. P. and S. Geometry.	Magnetism and Electricity.	Mathematics.	Latin.	Book-keeping.
Thursday.	Latin.	Mathematics.	Chemistry (Practical).	P. P. and S. Geometry.	Mechanics.	French.	Shorthand.
Friday.	French.	Animal Physiology.	Mechanics.	English.	Model.	Perspective.	

FIRST YEAR.

	Morning.			Afternoon.		
	9–9.30.	9.30–10.30.	10.30–11.15.	11.15–12.	1.30–2.40.	2.40–4.	4–4.30.
Monday.	English.	Mathematics.	English.	Chemical Arithmetic.	Mathematics.	Geometrical Drawing.	Handwriting.
Tuesday.	Latin.	Mathematics.	Practical Chemistry (Notes).	Magnetism and Electricity.	Chemistry (Theory).	Chemistry (Practical).	Handwriting.
Wednesday.	French.	Mathematics.	English.	Physiology (Notes).	Physiology.	Magnetism and Electricity.	Handwriting.
Thursday.	Latin.	Mathematics.	Freehand.	Drawing.	Mathematics.	Chemistry (Practical).	Handwriting.
Friday.	French.	Magnetism and Electricity.	Chemical Arithmetic.	Physiology.	Physiology.	Freehand Drawing.	

THIRD YEAR.

Preparation for the Preliminary Examinations at Owen's College, the Victoria University, and those of Law, Medicine and Pharmacy. The Students compete for a Scholarship of the value of £100 every two years.
Manual Instruction in Wood-work and use of Tools to Second Year Students from 4 to 5 p.m. daily.

Chemistry (all Stage 2), Plane and Solid Geometry, Theoretical Mechanics (Stage 1).

LANGUAGES. — English, French, German, Latin, and Greek.

MERCANTILE. — Book-keeping, Shorthand, Correspondence, Handwriting.

THIRD YEAR.

SCIENCE and LANGUAGES.

'Let me call your attention to the fact that this is not a science school pure and simple. Other subjects (languages especially) are added partly with a view to their practical utility, partly that the education may not be one-sided, and partly to prepare the "Mason Scholar" for his future career at the University.'

'You have already given the results of one year's successes in the Science, can you now give some information as to the aggregate results you have achieved since your Higher Grade School was first opened?'

'I can best give you these details by putting into your hands a printed slip, upon which the successes of our old scholars have been recorded up to the year 1890. Here it is :—

(*a*) 154 have become Certificated Teachers.

(*b*) 316 have become Assistant Masters or Mistresses.

(*c*) Fifty-nine have passed the University Local Examinations, and in five cases prizes were obtained.

(*d*) Ninety-six have passed the Preliminary Examination of the Pharmaceutical Society.

(*e*) Thirty-six have obtained certificates qualifying them to give instruction in Drawing under the Science and Art Department.

(*f*) Twelve have passed the Preliminary Examination of the Incorporated Law Society.

(*g*) Four have obtained Foundation Scholarships for three years at the Manchester Grammar School.

(*h*) Fourteen have passed the Preliminary Medical Examination.

(*i*) Upwards of 600 Queen's Prizes have been gained.

(*j*) Quite 2,000 Certificates have been gained from the Science and Art Department.

(*k*) Two Bronze Medals have been gained.

'In addition to this, twenty-one have matriculated at London University, five in Honours; seven have passed the 1st B.A.; six are solicitors; four are practising as physicians and surgeons; two are in the Home Office; one is Assistant to H.M.I. of Schools; three are Bachelors of Science of Victoria University, all in Honours; one is assistant to Professor Craik, at Oxford University; two are Masters of Arts of Victoria University; and one has gained an open scholarship at St. John's College, Cambridge.'

'That is, indeed, an excellent record, and one of which any elementary school may well be proud. Your old scholars appear to have caught your zeal for work. It would be interesting to inquire as to the career of the Mason Scholars at the Universities.'

'As the examination for the Mason Scholarship is only held every alternate year, there have thus far only been eight of these scholars, and some of their successes are included in the above record. There is not one of them but has done creditably at the University, and one or another of them has in open competition gained the Seaton Junior Mathematical Scholarship, the John

Dalton Junior Mathematical Scholarship, the Old English Scholarship, the Shakespeare Scholarship, and the Bradford Scholarship (two years, £40). The Berkeley Fellowship £100 has been twice gained by old Albion scholars, and two of them hold the Langton Fellowship of £150. A former Mason Scholar is now Professor of English Literature at Berlin. It was a Mason Scholar who was first in the list in Mathematics at St. John's College, Cambridge, and who was tenth wrangler in this year's Mathematical Tripos.'

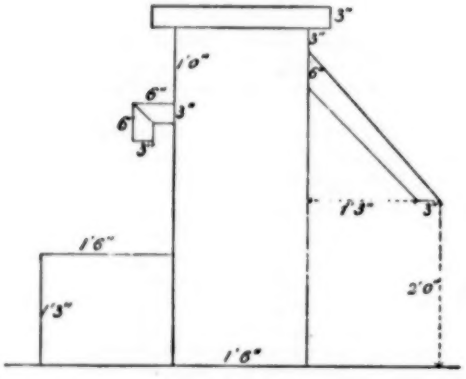
In taking leave of Mr. Park we felt it vain to hope that this brilliant record might be surpassed, but we expressed a sincere hope that it might long be maintained. For these achievements great credit must be attributed to the sympathy and liberality which Mr. Park has always experienced at the hands of his managers; but it is due to Mr. Park's indomitable energy and perseverance alone that the Albion Schools have set an example to the country in bridging the gulf which at one time separated the elementary school from the University.

TEACHERS' NOTES OF DRAWING LESSONS FOR STANDARD IV.

By E. BUFFERY RIDGE.

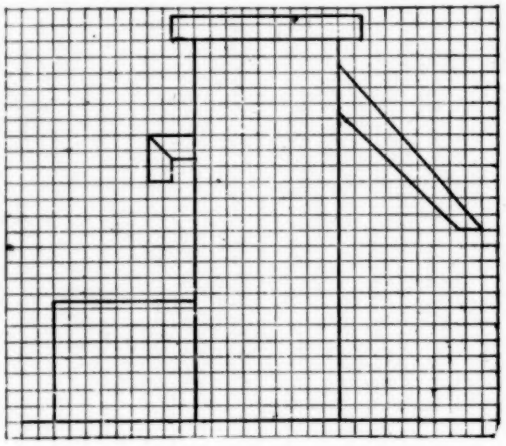
Art Master under the London School Board.

DRAWING TO SCALE.—STANDARD IV.

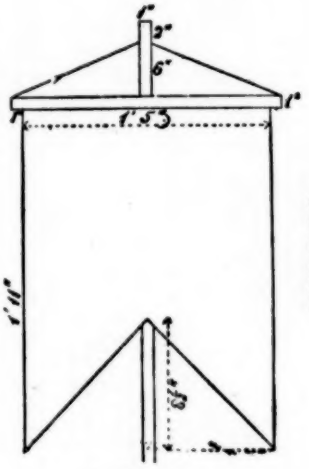


7. Pump. 1 sq. = 2"

One square = 2 inches. Begin at the bottom. Leave the handle till last, then count 24" = 12 squares up the side line from the bottom and 15" + 3" = 9 squares to the right. This fixes the right-hand corner of the end of the handle, from which draw 3" = 1½ squares towards the left. Join the bottom end to the marks put for the top end. In drawing the spout be careful to make the inside lines (not the slanting line) exactly 1½ squares each.

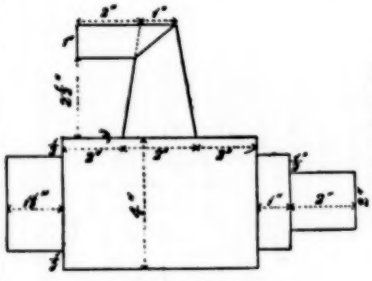


Things to note.



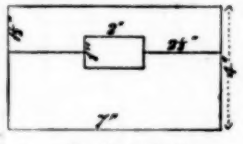
The 8½ inches difference in height between the outside corners of the banner and the middle notch. The pole may be any length.

8. Banner.



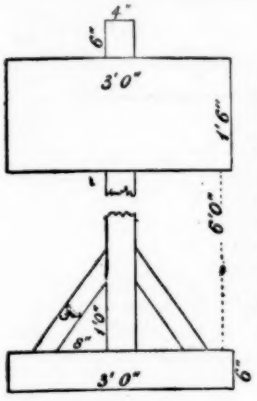
The chimney. Be sure to get the 1 inch at the bend of the chimney exactly over the middle of the 2 inches at the bottom of it.

9. Magic Lantern.



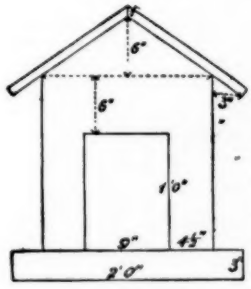
Get the clasp right, that is—2½ inches from each end and ½ inch above and below the cross-line.

10. Pocket Book.



Draw the post full length, not broken as in the copy to save space. At the bottom are two slanting pieces of wood called struts. Measure 1 foot up and 8 inches along, and draw the inside line of each strut. The outside line will be parallel and 3 inches = 1½ squares away. Make the *slanting* distance across between the lines equal to 1½ squares measured *straight*.

11. Notice Board.



The under line of the roof to be drawn till it reaches three squares beyond the side of the house. The top line to start one square above in the middle, and the ends to be joined by a line at right angles.

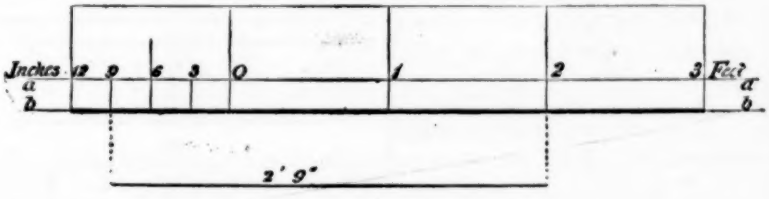
12. Dog Kennel.

Scales.—Use the set-squares (Plain Paper).

Scales are lines exactly measured and divided into parts from which other measurements may be taken. They must be very true. They must not be marked or spoiled when used, but left untouched to be used again.

Draw a scale of 1 inch to the foot. Let it be 4 inches long, representing 4 feet.

Rule two parallel lines about ¼ of an inch apart; they must be as thin as possible and longer than you want them—look at *a a* and *b b*. The top line *a a* is the working line; measure on it four equal distances of 1 inch each. Four spaces will want five marks. Count the spaces and count the marks.



With the set-square draw perpendicular lines, one at each mark, about ½ an inch above *a a*, all of the same height, and a line along the top to finish them off. The four spaces now stand for four feet.

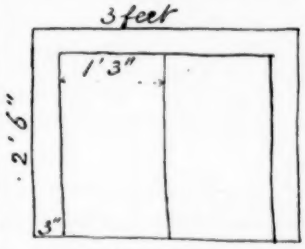
Numbering—Always start at the second upright line from the left with a nought. Put 0, 1, 2, 3, as in the copy, and write feet at the right-hand end.

Inches—The left-hand space is for inches. It stands for 1 foot or 12 inches. If it is divided into 12 equal parts each part will stand for 1 inch. Half of it will be 6 inches, and a quarter 3 inches, which will be enough for this scale. Draw an upright line in the middle, not so high as the other uprights, and short ones at the quarters, as in the copy. Start with the same 0, and number towards the left 3, 6, 9, 12 inches, and write inches at that end. Thicken the bottom line.

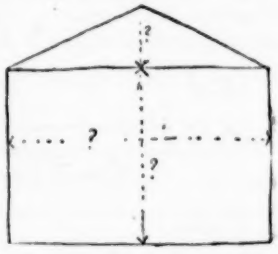
Show by the scale 2 feet 9 inches. At the divisions marked 2 in the feet, and 9 in the inches, draw perpendicular lines downwards, and a line parallel to the scale between them. This will be the length required. Write along it, 2′ 9″. Twelve such lines would be really 2 feet 9 inches.

Look at scales on the maps. The countries are drawn to scale.

Draw the cupboard to the scale of 1 inch to 1 foot.

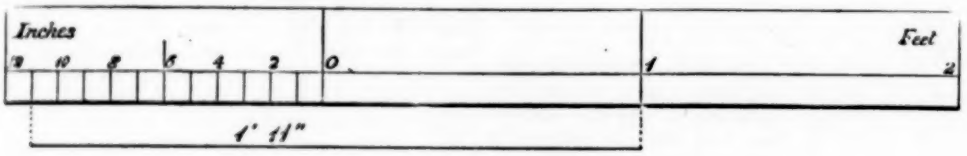


Be very careful always to use the set-square for perpendicular and horizontal lines so as to get them at right angles. Draw a horizontal line for the bottom of the cupboard and a perpendicular line for the middle (any length). With a pair of compasses, or a slip of paper, measure on the scale from 1 in the feet to 6 in the inches, and mark the distance on the horizontal line of your drawing on each side of the middle line. Then the bottom will be 3 feet, the same as the top. Again, measure on the scale from 1 in feet to 3 in inches, and mark that on the bottom line each side of the centre. Draw upright lines any length from each mark with the set-square. Measure 2 feet 6 inches, and mark each of the two outside lines, and draw the top line. Take 3 inches from 2′ 6″, leaving 2′ 3″. Measure that and mark the two inside lines and draw the second line at the top. Clean up the drawing, and rule over again the exact lines of the cupboard, taking very great care to make the lines meet nicely at the corners.



Measure a map, and draw to the same scale.

Draw a scale of 2 inches to the foot, to show 3 feet,

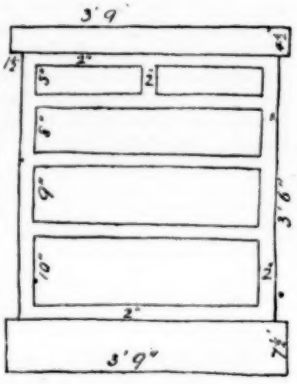


and mark a distance according to the scale of 1 foot 11 inches.

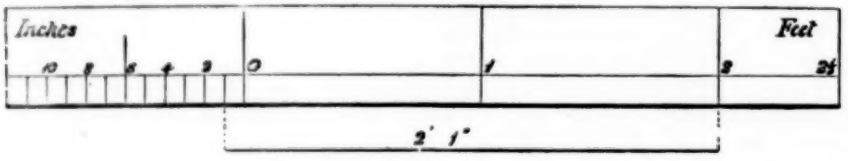
Rule parallel lines, and mark along them 2 inches three times, 6 inches altogether. Draw upright divisions with set square. Number 0, 1, 2 feet.

The left-hand division 2 inches long must be divided into 12 equal parts to stand for inches. Find on the ruler inches divided into 12 parts, and copy the divisions of 2 inches, but taking 2 for 1 as if each inch contained 6 parts, then you will have 12 parts in 2 inches. Number 0, 2, 4, 6, 8, 10, 12 inches backwards, as in the copy. From 1 in the feet and 11 in the inches draw perpendiculars down, and between them a horizontal line 1 foot 11 inches long, according to scale.

Scale of 1½ inches to 1 foot, 3 feet 6 inches long. Draw a line 2 feet 1 inch.

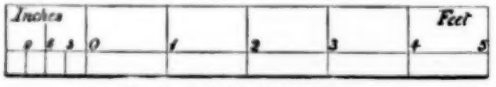


To measure 1½" look on the ruler for inches divided into 8 parts, and take one part. For 4½" take three parts, and for 7½" take five parts.

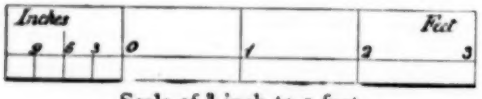


Mark 1½ inches three times, and then for the 6 inches, which is half a foot, mark ¾ of an inch, that is half of 1½ inches. Number 0, 1, 2, 2½ feet.

Look on the ruler for inches divided into eight parts. Twelve of these make 1½ inches. Mark them on the drawing in the left-hand division, and number them backwards, 0, 2, 4, 6, 8, 10 inches. Do not any more put in the number 12 at the end. It is there all the same, but need not be numbered.



Scale of ½ inch to 1 foot.

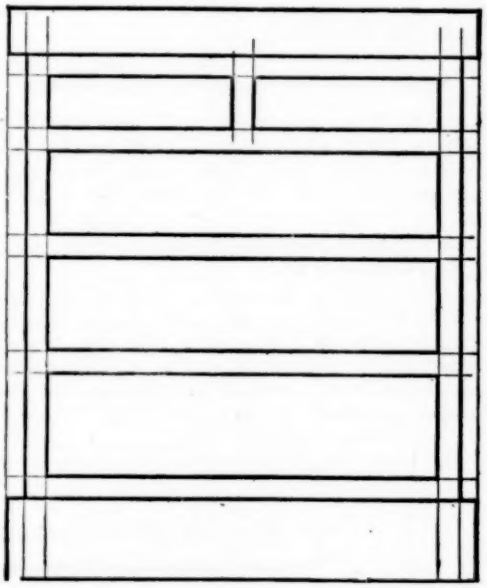


Scale of ¾ inch to 1 foot.

A scale of 2 ins. to 1 ft. is ⅛ of the real size. (Scale of one-sixth.)
" 1½ " 1 " ⅛ " (Scale of one-eighth.)
" 1 " 1 " 1/12 " (Scale of one-twelfth.)
" ¾ " 1 " 1/16 " (Scale of one-sixteenth.)
" ½ " 1 " 1/24 " (Scale of one-twenty-fourth.)

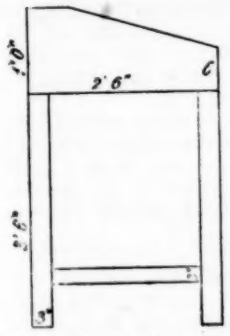
To be learnt :—1½ inches = ⅛ of a foot.
4½ " = ⅜ "
7½ " = ⅝ "
10½ " = ⅞ "

Draw the chest of drawers to the scale of 1 inch to the foot with ruler divided into twelfths of an inch.

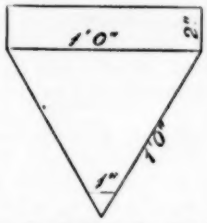


Length of long drawers equals 3' 6" with 2" taken off each end, leaving 3' 2". Short drawers at the top will be 3' between the two, because there is 2" to take out of the middle, that is 1' 6" each.

Draw thin working lines right through. Clean up and go over figure again with sharp pencil. Mind the corners.

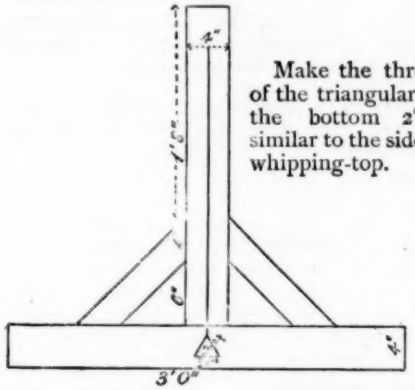


Desk—Scale 1″ to the ft.



Top—Scale 2 inches to 1 foot.

Draw a centre-line, and make the slanting sides 1 foot according to scale. Don't measure the centre-line.*



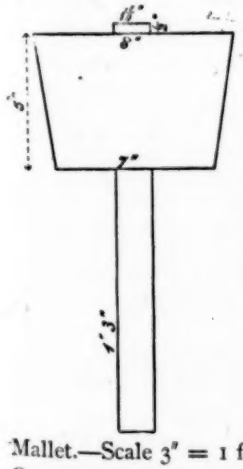
Make the three sides of the triangular hole in the bottom 2″ each, similar to the sides of the whipping-top.

Mason's Plumb-line. Scale $1\frac{1}{2}$″ to 1 foot.

Measure a door, window, cupboard or desk, and draw it to the scale of $1\frac{1}{2}$ inches to 1 foot.

Three inches to the foot = *one-fourth* of full size.

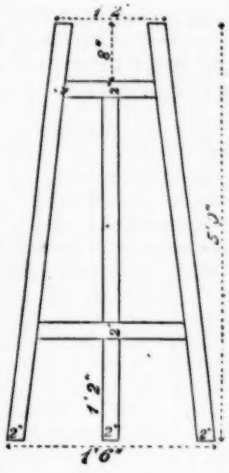
One-fourth of 1′ 3″	=	$3\frac{3}{4}$	inches.
,, 8″	=	2	,,
,, 7″	=	$1\frac{3}{4}$	,,
,, 5″	=	$1\frac{1}{4}$	,,
,, $1\frac{1}{2}$	=	$\frac{3}{8}$	,,
,, $\frac{1}{2}$	=	$\frac{1}{8}$	,,



Draw the handle right through first, using a centre-line. With the set-square draw lines at right angles for the head, $\frac{1}{8}$ of an inch from the top, another $1\frac{1}{4}$″ below that. Mark the top line 4″ = 1″ on each side of the centre-line, and the other $3\frac{1}{2}$″ = $\frac{7}{8}$″ on each side.

Mallet.—Scale 3″ = 1 foot.
On squared paper 1 sq.=$\frac{1}{2}$″

* See Standard III.



$\frac{3}{4}$″ to a foot=one-sixteenth of full size. Find inches on the ruler divided into 16 parts; each part will stand for 1 inch; or, find eighths, each part 2 inches. Draw a centre-line. The top is 14 inches = 7 eighths. Mark half of this =7 sixteenths, or $3\frac{1}{2}$ eighths each side of the centre-line. At the bottom mark 9 sixteenths, or $4\frac{1}{2}$ eighths each side of the centre. All the parts are 2″ or $\frac{1}{8}$″ according to scale in width, but take care to mark the middle upright one-sixteenth on each side the centre-line.

Easel—Scale $\frac{3}{4}$″ = 1 foot.
On squared paper 1 sq. = 2″

For further exercises, draw the figures given for squared paper on plain paper, and *vice versâ*.

One square	= $\frac{1}{4}$″	is the same as	6	inches to	1 foot.
,,	= $\frac{1}{2}$″	,,	3	,, 1	,,
,,	= 1″	,,	$1\frac{1}{2}$	,, 1	,,
,,	= 2″	,,	$\frac{3}{4}$	,, 1	,,
,,	= 3″	,,	$\frac{1}{2}$	,, 1	,,

One in. to a ft.=$1\frac{1}{4}$″ each square
Two ins. to a ft.= $\frac{1}{4}$″ ,,

As these are rather awkward, it will be better to draw the figures to a different scale, such as one square = 1″

PRACTICAL NEEDLEWORK.

BY J. W. WARREN.

Inspectress of Needlework, Leicester School Board.

We have to deal with the choice of garments in the Fourth Standard now, but before doing so we note that those of Standard V. are to be the same. This gives an opportunity to introduce one garment this month not mentioned in Schedule III., but nevertheless eminently suited, namely, a good wearing and fitting combination. It is time that this useful garment had more attention in our schools, for it is certainly, though slowly, creeping to the front, and our future mothers should know how to make it, both on the score of economy and health. The other diagram is a petticoat for a girl of from ten to twelve years, a most useful and comfortable shape, though the poor child as a rule seldom wears it. I have given this with a low bodice, but a very slight alteration at the shoulder slope will convert it into an excellent high-necked pattern for flannel or shirting. My object is to give for this

standard a calico garment in which gathering, button-hole, and button can be shown. Gathering clearly introduces our pupils to the more substantial garments, and enables them to leave the everlasting hem, hem, hem, of the much-despised but very useful pinafore, pocket-handkerchief, and apron. It will be well for the teacher at this point of departure to review the possibilities of her class. A plain nightgown with the minimum of gathers and the maximum of seaming will do equally well with those given in this article; but this garment is very often introduced with doubtful success, because taken *too small* with yoke and wrist-band sleeves. Babies' fully cut nightgowns are not only too elaborate, but require material too fine for this standard, and are seldom finished off well enough to repay one the hours of fixing required. Make a night-shirt for a boy of seven years with plain sleeves, and gathered into a straight two-inch band at throat, buttoning at back, with a nice loose placket opening or something like it; for a girl of five years, only gathered in three inches at waist, and a draw string at the neck. Make up your mind not to be too ambitious, and you will find plenty of useful small enough garments. A fancy print apron with gathered bib is a capital garment here for stitches required, and hundreds of beautiful shapes can be got, making it quite superfluous to give one; but I must now describe the garments given in the diagram.

The combination given is suitable for a girl of ten, and should be made in a good stout calico. The band round waist secures comfort and strength, and is to be preferred to many patterns more quickly made. Up to the age of ten, drawers need to be closed at the back, and the body should be cut separate, as the child so young isn't sufficiently developed for a sloped garment from neck to knee. The band allows for the constant strain on the drawers in play, and, in the absence of stays, is warm and firm. The legs are finished with a 1½ inch hem and two half-inch tucks, for which the pattern given allows. If bands are substituted, the length must end at the line indicated in the diagram; if made for the school children, there are strong reasons for adopting the drawer hem and tucks—bands never wear so well.

The back may be fastened with *three* large flat buttons, one of which should be on the band, and two only on bodice; the button-holes should run across the bodice, not down it; the half-band requires *three* button-holes, one of which should run at right angles to the band, and will serve to hold back part of garment secure by being fastened on to *band button* mentioned above. The two other *buttons* must be sewn at sides, and should be put exactly at the half of band before it is buttoned over, which will bring them about an inch more *back* than front, a very necessary arrangement, keeping the opening closed better.

The gathering of legs part should be *equally* distributed, leaving only one inch where side button-hole comes, and the same in front.

The bodice, too, should be so distributed, plain only at the broad hem at back. A hem on the bias should be put round neck sleeves and side leg openings. The sleeve seam should be placed *one inch* to front of side bodice seam.

Notice two children can work at one garment, as the top is quite distinct from the drawers, and the only attachment needed can be done *last of all*. The code requirements will be quite fully met by this means.

Bodice of Combination.—Cut in three pieces; join first the backs to front, shoulders also; then hem both backs with an inch hem; bind the top with a cross hem (no slip string); cut out and fit in the sleeves, putting sleeve seam one inch in front of side seam of body; simple narrow hem here only.

The waist of bodice must be gathered and set into the front band (see diagram). Notice that this band must be put in two pieces, needing, as it does, the bodice at the top and the front of drawers at the lower part. The bodice should go from end to end of band, just eased in; do not gather over the back hems. Up to this point of work one girl can be employed alone. She will have done all the code work.

Drawers of Combination.—Make each drawer up, finish off with a two-inch hem. Then join both legs together right up from front to back. Now slit down the sides *nine inches*; put a nice firm one-inch binder here; do not make up as a placket. Let girl who is doing this work set back of drawers into *back band* (see diagram). Notice this band need not be in two pieces. The drawers are complete now, except for the front, which the *first girl* must gather into front half of band upon bodice. With these explanations it will be found that the combinations are properly put together, and will be found to fit and wear excellently.

If the garment is made up for an older child, it can be opened at back and gathered into the band on bodice, and the smaller band with side openings dispensed with altogether. Flannelette or common flannel is an excellent material for this garment, but the pattern is given for calico.

Pattern of Girl's White Petticoat.—Cut the bodice in three pieces; join up shoulders and sides with seam and fell; bind the top and put a draw-string; secure this in front; put a broad false hem on the back for buttons and holes. Now put this on one side.

Cut two pieces of calico full width, but if only 28 in. wide it will do as well as that given in pattern. Join these up entirely; finish with a broad hem at bottom, and a gathering thread at top; this gathering should not be too fine. *A placket is not needed*, as the bodice will come below the waist, and will be found quite loose enough to admit of the child's head and shoulders. Now take bodice; turn in three-quarters of an inch round bottom; set in gathers of skirt; put a little more at back than front, and finish off with a cross band, through which run a strong tape. No tucks are needed in this pattern.

In giving these patterns I cannot refrain from suggesting that the gathering should be thoroughly perfected before the garments are begun.

If flannel garments are needed both of these will do, but the bodice of petticoat must be made smaller.

Next month I purpose giving all the paper to the specimens of the Fifth Standard.

MODEL ANSWERS TO THE MATRICULATION QUESTIONS.

London: June, 1891.

LATIN.

Monday, 8th June. Afternoon, 2 to 4.

Examiners.—J. S. Reid, Esq., Litt. D., M.A.,
Prof. R. Y. Tyrrell, D. Litt., LL.D., M.A.

I. *Livy: Book I.*

1. *Translate into English:—*

A.

Atque omnium primum ad cursus lunæ in duodecim menses describit annum; quem, quia tricenas dies singulis mensibus luna non explet, desuntque dies solido anno, qui solstitiali circumagitur orbe, intercalariis mensibus interponendis ita dispensavit, ut vicesimo anno ad metam eandem solis, unde orsi essent, plenis omnium annorum spatiis dies congruerent, idem nefastos dies fastosque fecit, quia aliquando nihil cum populo agi utile futurum erat.

And first of all, he divided the year into twelve months, in accordance with the courses of the moon; and so regulated it by inserting intercalary months,—since the moon does not make up thirty days in each month, and consequently the full year, which is described in the solar orbit is some days short—that every twentieth year the period of all the (intervening) years was completed, and the days coincided with the same position of the sun as at the beginning of the cycle. He also appointed days 'nefast' or holy, and 'profest,' or not holy, because it was sure to be found expedient that at certain times no business should be brought before the people (c. 19).

B.

Lucumoni contra omnium heredi bonorum cum divitiæ iam animos facerent, auxit ducta in matrimonium Tanaquil summo loco nata, et quæ haud facile his, in quibus nata erat, humiliora sineret ea, quo innupsisset. spernentibus Etruscis Lucumonem exule advena ortum, ferre indignitatem non potuit, oblitaque ingenitæ erga patriam caritatis, dummodo virum honoratum videret, consilium migrandi ab Tarquiniis cepit. Roma est ad id potissimum visa: in novo populo, ubi omnis repentina atque ex virtute nobilitas sit, futurum locum forti ac strenuo viro; regnasse Tatium Sabinum, arcessitum in regnum Numam a Curibus, et Ancum Sabina matre ortum nobilemque una imagine Numæ esse.

In Lucumo, on the other hand, who was now heir to all the property, ambitions were stirred by his wealth and strengthened by his marriage with Tanaquil, a woman of high position, and not one to endure with patience that the rank of the man she had married should remain inferior to that in which she had been born. As the Etruscans looked with contempt upon Lucumo, as the son of a foreign exile, she could not support the indignity, but, dismissing sentiments of patriotism, if only she might see her husband distinguished, she resolved to leave Tarquinii. She thought that Rome was best suited to her purpose; in a new State, where all nobility was upstart and dependent upon personal character, there would be room for a man of courage and energy; one king had been Titus—a Sabine; Numa had been called to the throne from Cures, and Ancus himself was born of a Sabine mother, and could claim nobility only through possessing the bust of Numa (c. 34).

[*In (d) and (e) Candidates are required to translate only the words in italics.*]

(*a*) Forte quadam divinitus super ripas Tiberis effusus lenibus stagnis nec adiri usquam ad iusti cursum poterat amnis, et posse quamvis languida mergi aqua infantes spem ferentibus dabat.

(*b*) Ventoque iuvante accensa ligna et pleraque in ratibus inpacta sublicis cum haererent pontem incendunt.

(*c*) Convalles, quia ex planis locis haud facile evehebant aquas, cloacis fastigio in Tiberim ductis siccat.

(*d*) Et se rectius *viduam* et illum cælibem futurum fuisse contendere quam cum impari iungi.

(*e*) Aureum baculum inclusum *corneo* cavato ad id baculo tulisse donum Apollini dicitur.

(*a*) It happened providentially that the Tiber, having overflowed its banks and formed itself into stagnant pools, could not be approached, that is, it was impossible at any point to approach the regular channel of the river, and those who carried the infants reckoned that, although it was almost motionless, they would be drowned in the water (c. 4).

(*b*) And, the wind being favourable, the logs took fire; and when most of them, being on rafts, drove against the piles and stuck there, the bridge took fire (c. 37).

(*c*) And since it was difficult to convey water from (so) low a level, he drained the hollows between the hills by means of sewers carried down a regular slope into the Tiber (c. 38).

(*d*) An unmarried woman.

(*e*) Of cornel-wood.

II. *Questions arising out of the prescribed book*:—

1. Write an historical note on this passage, which you are not required to translate:—

Bis deinde post Numae regnum clausus fuit (Janus), *semel T. Manlio consule post Punicum primum perfectum bellum, iterum quod nostrae aetati di dederunt ut videremus, post bellum Actiacum ab imperatore Caesare Augusto pace terra marique parta.*

The doors of the Temple of Janus in the Forum were shut in time of peace. Livy states that this happened three times—in the reign of Numa, after the first Punic war (B.C. 235), and after the battle of Actium, which took place B.C. 31. On the last occasion the temple was not actually closed until the return of Augustus, B.C. 29. Hence the above passage could not have been written before B.C. 29. Further, the title Augustus was conferred upon Octavianus, B.C. 27, hence the above words could not have been written before 27 B.C. Lastly, Suetonius states that the Temple of Janus was closed *thrice* in the reign of Augustus, the second occasion being in B.C. 25. Hence the above passage cannot have been written later than 25 B.C.

2. Give the geographical position of *Crotona*, *Cumae*, *Ephesus*, *Mutina*, *Patavium*, and refer to some incident (historical or literary) connected with each town:—

Crotona (mod. *Cotrone*), was situated on the east coast of the Bruttian peninsula, a few miles north of the Lacinian promontory. Here the philosopher Pythagoras established himself about the middle of the sixth century B.C., became a great power in the state, and attracted many disciples.

Cumae (mod. *Cuma*) was on the coast of Campania, a few miles north of Cape Misenum. Here was the cave where dwelt the Sibyl.

Ephesus was a city in Lydia, near the mouth of the Caystrus. It was famous for the temple of 'Artemis Ephesia,' of which Livy, in his account of Servius, says, '*Jam tum erat inclitum Dianae Ephesiae fanum.*'

Mutina (mod. *Modena*), an important city of Gallia Cispadana, on the Via Aemilia, between Parma and Bononia. It gave its name to the *bellum Mutinense*. Before Mutina, in 43 B.C., first Pansa and then Hirtius, the two consuls, were slain in fighting against M. Antonius.

Patavium (mod. *Padua*), an important city of Venetia, about 20 miles west of the site of Venice. Here Livy was born, and died (A.D. 17).

3. Write notes on *apparitor*, *pater patratus*, *populus*, *Annales Maximi*, *Libri Lintei*.

Apparitor was a term used for any underling of a magistrate, as a lictor, scribe, crier.

Pater patratus was a title given on particular occasions to a chosen member of the College of Fetials. The Fetials superintended the ceremonies connected with peace and war, and the making and keeping of treaties. For a special service of this sort a deputation was chosen from the College, and a *president of the deputation* was elected. This was the *pater patratus*. It might be necessary for him, if any treaty-rights had been violated, to deliver up the offending citizens, and it is supposed therefore that he had *patria potestas* over the persons of all citizens, and was named as 'having been made a father.'

Populus (perhaps from the root of *pleo*, *plenus*, &c., and so connected with *plebs*) meant in Rome the Body Politic, the Body of Burgesses who possessed political privileges. Hence its constitution was different at different times. At first the Patricians alone made up the Populus. Then all who had votes in the Comitia Centuriata became members of the Populus. In the formula S.P.Q.R. the People is opposed to the Senate. The word is often opposed to *plebs*, but rarely used for it.

Annales Maximi; an account of the occurrences of each year, drawn up by the Pontifex Maximus. They were afterwards collected into eighty books. The information they contained was the names of consuls and other magistrates, prices of corn, eclipses, &c.

Libri Lintei, an ancient chronicle of the Roman people, which was written on *linen*, and preserved in the Temple of Juno Moneta.

4. What traces remain of an old (*a*) Italian Mythology; (*b*) Poetry?

(*a*) The traces of early Italian Mythology have been obscured by the tendency of the Romans to 'humanise' their deities, and to identify them with the gods of the Greeks.

Diovis or *Jovis*, the great Father, was a native god, with attributes distinct from those of Zeus.

Maurs or *Mars*, the killing-god, was peculiarly *the* deity of the Romans. He appears with his woodpecker in the oldest Italian prophecies.

Quirinus, his duplicate, was an old Sabine deity. Livy himself disregards the fable that Romulus and Quirinus were the same. No part of the Italian Mythology was so deep-rooted as the belief in tutelary deities, both public and private, as *Vesta*, *the Penates*, *the Lares*, &c.

Hercules was the Italian god of faith and property. He was quite a different conception from the Greek Heracles.

Faunus and *Picus* were agricultural deities, though Vergil speaks of them as old Italian kings. The former, as guardian of flocks, was called Lupercus, and became identified with the Lycean Pan. Along another tradition he develops into Evander.

Latinus was an early Italian deity, the son of Faunus and a nymph. He was eventually humanised into the old king of the native Laurentians.

Janus was one of the most distinctive of the old Italian deities. All beginnings were sacred to him. Of course the myth makes him a native king. *Saturn*, and his daughters *Juno* and *Ceres*, were originally independent Italian conceptions. Probable examples of the 'manufacture of History out of Mythology' are—*Cacus*, *Rea Silvia*, *Acca Laurentia* ('mother of the Lares'), *Titus Tatius*, *Tarpeia*, and others. In the case of the last two names, we know that yearly sacrifices were paid to their supposed tombs.

(*b*) Traces of early Italian poetry remain as follows:—

(1) Metrical songs of soothsayers, rhythmic incantations, spells, &c. Cato the elder gives a specimen.

(2) The religious chants of the Salii and other brotherhoods. Fragments of Salian songs are extant, as well as the song of the Arval Brothers in honour of Mars.

(3) The panegyrical chants in which stories of ancestors were preserved from generation to generation. These received some literary form during the time of the Punic wars, and, in poetical form, were greatly admired by Cicero.

(4) The Fescennine songs—alternate chants, sung by dancers at the carnivals or *saturae*.

III. *Passages for translation from books not prescribed*:—

(N.B.—Translate *one* only of the passages in prose, and *one* of those in verse.)

A.

1. Ibi cognoscit consensu omnium Antiochensium civiumque Romanorum, qui illic negotiarentur, arcem captam esse excludendi sui causa nuntiosque dimissos ad eos, qui se ex fuga in finitimas civitates recepisse dicerentur, ne Antiochiam adirent: id si fecissent, magno eorum capitis periculo futurum. idem hoc L. Lentulo, qui superiore anno consul fuerat, et P. Lentulo consulari, ac nonnullis aliis acciderat Rhodi; qui cum ex fuga Pompeium sequerentur atque in insulam venissent, oppido ac portu recepti non erant missisque ad eos nuntiis, ut ex his locis discederent, contra voluntatem suam naves solverunt.

There he learnt from unvarying statements made by all the inhabitants of Antioch, and by the Roman citizens who were trading in that place, that the citadel had been seized for the purpose of keeping him out of the town and messengers despatched to those who were reported to have taken refuge in the neighbouring states, warning them not to come to Antioch, and threatening that if they did, it would be at great risk of their lives. Lucius Lentulus, who had been consul the year before, Publius Lentulus, another ex-consul, and some others had met with the same treatment at Rhodes; for these men, in the pursuit of Pompey after his defeat, came to the island, but were refused admittance to the town and harbour, and upon receiving notice to leave those parts were reluctantly compelled to sail away.

2. Legati Ariarathis, puerum filium regis secum adducentes, Romam venerunt; quorum oratio fuit, regem educandum filium Romam misisse, ut jam inde a puero adsuesceret moribus Romanis hominibusque. petere, ut eum non sub hospitum modo privatorum custodia, sed publicae etiam curae ac velut tutelae vellent esse, ea regis legatio grata senatui fuit; decreverunt, ut Cn. Sicinius praetor aedes instructas locaret, ubi filius regis comitesque ejus habitare possent.

Ambassadors came to Rome from King Ariarathes, bringing with them his youthful son. Their plea was that the king had sent his son to Rome to be educated in order that he might, even from his boyhood, be accustomed to Roman ways and Roman people. Their petition, they said, was that he might be admitted by them, not only into the homes and guardianship of private citizens, but as the charge and ward, as it were, of the state. This embassy from the king gratified the senate. They decreed that the praetor, Gnaeus Sicinius, should lease and furnish a house where the prince and his attendants might dwell.

B.

1. Ipse sub Esquiliis, ubi erat sua regia, caesus
Concidit in dura sanguinulentus humo.
Filia carpento patrios initura penates,
Ibat per medias alta feroxque vias.
Corpus ut aspexit, lacrimis auriga profusis
Restitit, hunc tali corripit illa sono:
'Vadis, an expectas pretium pietatis amarum?
Duc, inquam, invitas, ipsa per ora rotas.'

He himself, at the foot of the Esquiline, where his own palace stood, was slain, and lay on the hard ground in his blood. His daughter, thinking to enter her father's home, along the middle of the way came riding, haughty and insolent, in her carriage. The driver, when he saw the corpse, burst into tears and stayed his course. Him she upbraids in words like these: 'Wilt thou drive on or wait to pay a bitter price for loyal show of grief? Guide thy unwilling wheels, I say, over his very face!'

2. Pervigilem superest herbis sopire draconem,
Qui crista linguisque tribus praesignis et uncis
Dentibus horrendus custos erat arboris aureae.
Hunc postquam sparsit Lethaei gramine suci,
Verbaque ter dixit placidos facientia somnos,
Quae mare turbatam, quae concita flumina sistunt;
Somnus in ignotos oculos sibi venit, et auro
Heros Aesonius potitur.

It remained to drug with herbs the wakeful dragon, who, with wondrous crest and triple tongue and curved fangs terrible to see, kept guard of the golden tree. When he had sprinkled it with the herb whose essence brings oblivion, and three times had uttered spells that cause calm sleep and still the troubled sea and rushing streams—then o'er the eyes, that knew it not before, sleep came, and the hero-son of Aeson held the gold.

LATIN II.

Monday Afternoon, 4 to 6.

Latin Grammar and Composition.

1. Decline together, in the singular and plural, ***ater turbo; pernix avis, istud fulgur.***

	Singular.		Plural.	
N.V.	ater	turbo	atri	turbines
Acc.	atrum	turbinem	atros	turbines
Gen.	atri	turbinis	atrorum	turbinum
Dat.	atro	turbini	atris	turbinibus
Abl.	atro	turbine	atris	turbinibus

	Singular.		Plural.	
N.V.	pernix	avis	pernices	aves
Acc.	pernicem	avem	pernic-es or-is	av-es or-is
Gen.	pernicis	axis	pernicium	avium
Dat.	pernici	avi	pernicibus	avibus
Abl.	pernic-i or-e	av-i or-e	pernicibus	avibus
N.V.A.	istud	fulgur	ista	fulgura
Gen.	istius	fulguris	istorum	fulgurum
Dat.	isti	fulguri	istis	fulguribus
Abl.	isto	fulgure	istis	fulguribus

2. Write down the positives, comparatives, and superlatives of the adverbs connected with ***malus, beneficus, facilis, nequam, acer, citus.***

male	peius	pessime
benefice	beneficentius	beneficentissime
facile (and facul)	facilius	facillime
nequiter	nequius	nequissime
acriter (and acre)	acrius	acerrime
cito	citius	citissime

3. Give the first person singular of the present indicative, and of the perfect indicative, and also the present infinitive of the verbs from which the following words come, viz., ***desuetus, fassus, gressus, haesurus, iratus, nixus, perculsus, peremptus, sepultus, subactus.***

desuetus	A. desuesco	desuevi	desuescĕre
	P. desuescor	desuetus sum	desuesci
fassus	fateor	fassus sum	fateri
gressus	gradior	gressus sum	gradi
haesurus	haereo	haesi	haerēre
iratus	irascor	iratus sum	irasci
nixus	nitor	nisus or nixus sum	niti
perculsus	A. percello	perculi	percellĕre
	P. percellor	perculsus sum	percelli
peremptus	A. perimo	perēmi	perimĕre
	P. perimor	peremptus sum	perimi
sepultus	A. sepelio	sepel-ivi or-ii	sepelire
	P. sepelior	sepultus sum	sepeliri
subactus	A. subigo	subegi	subigĕre
	P. subigor	subactus sum	subigi

4. Distinguish the senses of ***aequus, aequalis; arma, armus; copia, copiae; mālus, mălus; oblītus, oblĭtus; parum, parvum.***

aequus, equal in any quality,
level,
favourable,
equitable,
unruffled.

aequalis, that can be put on an equality with,
equal in age,
contemporary,
equal in size or form,
equable, unvarying.

arma 1. (pl.) armour, weapons, &c.
2. imperative of armare, to arm.

armus, the shoulder of an animal.

copia, 1. The goddess of abundance.
2. Plenty, wealth, power.

copiae, troops, forces.

mālus, adj., bad.

mălus, 1. (f.) apple-tree.
2. (m.) mast, beam.

oblītus (partic. of oblino), smeared over.

oblĭtus (part. of obliviscor), having forgotten, or, in poetry, being forgotten.

parum (subst. and adv.), too little, not enough.

parvum (neut. of parvus), small.

5. (*a*) Turn into Latin: 'He asked whether his father had come back.' (*b*) Represent in Latin *oratio obliqua:* 'Has my father come back?'

(*a*) Rogavit / Rogabat } num pater suus rediisset, or,
Rogavit paterne suus rediisset
(Suus might be omitted.)

In the English sentence '***his***' might conceivably refer to someone other than '***he***' refers to. The Latin would then be, Rogavit num pater eius rediisset.

(*b*) In the course of a reported speech the question would be, patremne suum, or, num patrem suum, rediiset.

6. Show what prepositions you would use, and with what cases, to represent the words in italics in the following sentences (*which need not be further translated*), viz., (*a*) a tree stood ***on this side of*** the bridge; (*b*) Pompey could not leave Italy ***owing to*** his illness; (*c*) the soldiers advanced *close up to* the wall; (*d*) the soldier kept guard *in front of* the camp; (*e*) Cicero was unjust *in the case of* Clodius.

(*a*) *Citra* or *cis* with accusative.

(*b*) *Propter* or *ob* with accusative.
Per with accusative (cause of his staying).
Prae with ablative (hindrance to his going).

(*c*) *Sub* with accusative.

(*d*) *Pro* with ablative.

(*e*) *In* with ablative, or possibly with accusative, if an adjective like *iniquus* preceded.

7. Put into Latin: (*a*) I must do this; (*b*) I could have done this; (*c*) I cannot help doing this; (*d*) You cannot keep me from doing this; (*e*) Do not let me do this; (*f*) Teach me how to do this; (*g*) Do not punish me for doing this.

(*a*) (Absolute necessity) 1. Mihi necesse (est) hoc facere.
2. Necesse est ut hoc faciam.
3. Necesse est hoc faciam.
(Duty binding on me) 4. Hoc me facere aportet.
(Duty owed to others) 5. Hoc facere debeo.
(General obligation) 6. Hoc mihi faciendum est.

(*b*) 1. Hoc facere poteram.
2. Hoc facere potui.

(*c*) 1. Non possum quin hoc faciam.
2. Facere non possum quin hoc faciam.
3. Non possum hoc non facere.

(*d*) Me prohibere non potes, quominus hoc faciam.
(The *quin* construction is rare with prohibeo.)

(*e*) Noli sinere / or / Ne siveris } me hoc facere / ut hoc faciam, or / hoc faciam.

(*f*) 1. (Teach me to do this.) Me doce hoc facere.
2. (Teach me how I am to do this). Me doce quomodo hoc faciendum sit.

(*g*) 1. Ne me puniveris quod hoc fecerim.
2. Ne me puniveris qui hoc fecerim.
3. *Feci* for *fecerim* in the above sentences would emphasise the fact of my having done this.
4. *Noli me punire* for *ne me puniveris*, as in (*e*).
5. *Puniri* for *punire;* the verb is sometimes deponent.

8. Translate into Latin *not more than five* of the following sentences, viz. :—

(*a*) A fountain rose not far from the temple.

(*b*) The general was ill for five months after being wounded.

(*c*) The city had been founded on the 17th May, 800 years before.

(*d*) Tell me the reason why you were distrusted by the king.

(*e*) Of what use is it to demand of the enemy the release of the prisoners?

(*f*) The Senate voted in favour of declaring war and calling on the allies to supply corn.

(*g*) The jury cannot find guilty of treason a prisoner arraigned for murder.

(*h*) A leader clever enough to win a victory ought not to be too lazy to make use of it.

(*a*) Haud procul a templo fons oriebatur.

(*b*) Dux post vulnus acceptum quinque menses aegrotabat.

(*c*) Octingentis ante annis ante diem sextum decimum Kalendas Junias urbs erat condita.

(*d*) Dic mihi quam ob rem tibi a rege non sit creditum.

(*e*) Quid prodest ab hostibus postulare ut captivos dedant?

(*f*) Bellum indicendum frumentumque sociis imperandum censuit Senatus.

(*g*) Reum parricidii maiestatis condemnare non licet iudicibus.

(*h*) Ducem tam callidum ut victoriam reportaverit, ignaviorem esse quam qui ea utatur non oportet.

GREEK.

Tuesday, 10 to 1.

Examiners—G. E. Marindin, Esq., M.A.,
Rev. William Wayte, M.A.

XENOPHON: *Anabasis, Book III.*

I. Translate into English :—

A.

Ἐκ τούτου Ξενοφῶν ἀνίσταται ἐσταλμένος ἐπὶ πόλεμον ὡς ἐδύνατο κάλλιστα, νομίζων, εἴτε νίκην δίδοιεν οἱ θεοί, τὸν κάλλιστον κόσμον τῷ νικᾶν πρέπειν, εἴτε τελευτᾶν δέοι, ὀρθῶς ἔχειν τῶν καλλίστων ἑαυτὸν ἀξιώσαντα ἐν τούτοις τῆς τελευτῆς τυγχάνειν. τοῦ λόγου δὲ ἤρχετο ὧδε· Τὴν μὲν τῶν βαρβάρων ἐπιορκίαν τε καὶ ἀπιστίαν λέγει μὲν Κλεάνωρ, ἐπίστασθε δὲ καὶ ὑμεις οἶμαι. εἰ μὲν οὖν βουλόμεθα πάλιν αὐτοῖς διὰ φιλίας ἰέναι, ἀνάγκη ἡμᾶς πολλὴν ἀθυμίαν ἔχειν, ὁρῶντας καὶ τοὺς στρατηγούς, οἳ διὰ πίστεως αὐτοῖς ἑαυτοὺς ἐνεχείρισαν, οἷα πεπόνθασιν. εἰ μέντοι διανοούμεθα σὺν τοῖς ὅπλοις ὧν τε πεποιήκασι δίκην ἐπιθεῖναι αὐτοῖς καὶ τὸ λοιπὸν διὰ παντὸς πολέμου αὐτοῖς ἰέναι, σὺν τοῖς θεοῖς πολλαὶ ἡμῖν καὶ καλαὶ ἐλπίδες εἰσὶ σωτηρίας. τοῦτο δὲ λέγοντος αὐτοῦ πτάρνυταί τις. ἀκούσαντες δ' οἱ στρατιῶται πάντες μιᾷ ὁρμῇ προσεύξαντο τὸν θεόν.

(II. 7—8.)

Thereupon Xenophon stood up, arrayed for war in the finest accoutrements he could command, because he believed that if the gods should grant them victory the finest equipment was suitable for conquering in, and if it should be necessary to die, it was right that having reckoned himself worthy of the finest accoutrements he should meet his death therein. And he began his speech as follows: 'Cleanor speaks of the perjury and faithlessness of the barbarians, and you also, I imagine, know them well. If then we are desirous of entering once more into friendship with them, we must needs be in great despondency, seeing as we do what has befallen even our generals, who, in good faith, placed themselves in the hands of the Persians. If however we are minded to take our arms and execute vengeance upon them for what they have done and henceforth be at war with them in every way, then, with the gods on our side, we have many bright hopes of deliverance.' As he pronounced the last word someone sneezed, and all the soldiers hearing it, by one impulse did reverence to the god.

B.

ἀπορουμένοις δ' αὐτοῖς προσελθών τις ἀνὴρ Ῥόδιος εἶπεν, Ἐγὼ θέλω, ὦ ἄνδρες, διαβιβάσαι ὑμᾶς κατὰ τετρακισχιλίους ὁπλίτας, ἂν ἐμοὶ, ὧν δέομαι ὑπηρετήσητε καὶ τάλαντον μισθὸν πορίσητε. ἐρωτώμενος δὲ ὅτου δέοιτο, Ἀσκῶν, ἔφη, δισχιλίων δεήσομαι· πολλὰ δ' ὁρῶ πρόβατα καὶ αἶγας καὶ βοῦς καὶ ὄνους, ἃ ἀποδαρέντα καὶ φυσηθέντα ῥαδίως ἂν παρέχοι τὴν διάβασιν· δεήσομαι δὲ καὶ τῶν δεσμῶν οἷς χρῆσθε περὶ τὰ ὑποζύγια· τούτοις ζεύξας τοὺς ἀσκοὺς πρὸς ἀλλήλους, ὡμίσας ἕκαστον ἀσκὸν λίθους ἀρτήσας καὶ ἀφεὶς ὥσπερ ἀγκύρας εἰς τὸ ὕδωρ, διαγαγὼν καὶ ἀμφοτέρωθεν δήσας ἐπιβαλῶ ὕλην καὶ γῆν ἐπιφορήσω.

(V. 8—10.)

Whilst they were in this perplexity, a certain Rhodian came up to them and said, 'Sirs, I am prepared to convey you across, four thousand hoplites at a time, if you will supply me with what I require and give me a reward of one talent.' And being questioned what he required, he said, 'I shall require two thousand skins. And I see many sheep, goats, oxen, and asses, which, if they were flayed and (the skins) inflated would easily furnish the means of crossing. And I shall require also the girths which you use for the beasts of burden. With these I shall join the skins together, making each one fast by attaching stones and letting them down into the water, and I shall carry the line across and fasten it to both banks and then lay down brushwood and upon that throw earth.'

II. General Questions on Grammar.

1. Write down the *genitive singular* and *dative plural* of **βοῦς, ἐλπίς, εὐδαίμων, λύσας, μέγας, ὀδούς, ὄνυξ, πιστις, προσελθών, ὕδωρ.**

βοός, βουσί(ν)—ἐλπίδος, ἐλπίσι(ν)—εὐδαίμονος, εὐδαίμοσι(ν)—λύσαντος λυσάσης λύσαντος, λύσασι(ν) λυσάσαις λύσασι(ν)—μεγάλου μεγάλης μεγάλου, μεγάλοις μεγάλαις μεγάλοις—ὀδόντος, ὀδοῦσι(ν)—ὄνυχος, ὄνυξι(ν)—πίστεως, πίστεσι(ν) — προσελθόντος προσελθούσης προσελθόντος, προσελθοῦσι(ν) προσελθούσαις προσελθοῦσι(ν) — ὕδατος, ὕδασι(ν).

2. Parse the following verbal forms, and give the present infinitive active of each :—

ἀποδαρέντα, ἀφείς, ἑάλω, ἐξέφηναν, ἐπιβαλῶ, ἐπιθεῖναι, ἐσταλμένος, ἐσφενδόνων, συνενηνεγμένα, συνεσκενασμένους, συνεστάθη, ὑπηρετήσητε.

ἀποδαρέντα—{sing., masc., acc., / plur., neut., nom. or acc.,} strong aor., partic., pass. of *ἀποδέρειν*.

ἀφείς—sing., masc., nom., strong aor., partic., act. of *ἀφιέναι*.

ἑάλω—3rd, sing., strong aor., indic., act. of *ἁλίσκομαι*, a deponent verb. The active infinitive may be seen in (*ἀν-*) *αλίσκειν*.

ἐξέφηναν—3rd, plur., weak aor., indic., act. of *ἐκφαίνειν*.

ἐπιβαλῶ—1st, sing., fut., indic., act. of *ἐπιβάλλειν*.

ἐπιθεῖναι—strong aor., infin., act. of *ἐπιτιθέναι*.

ἐσταλμένος—sing., masc., nom., perf., partic., pass. of *στέλλειν*.

ἐσφενδόνων—{1st, sing., / 3rd, plur.,} imperf., indic., act. of *σφενδονᾶν*.

συνενηνεγμένα—plur., neut., nom., or acc., perf., partic., pass. of *συμφέρειν*.

συνεσκευασμένους—plur., masc., acc., perf., partic., mid., or pass. of *συσκευάζω*.

συνεστάθη—3rd, sing., weak aor., indic., pass. of *συνιστάναι*.

ὑπηρετήσητε—2nd, plur., weak aor., subj., act. of *ὑπηρετεῖν*.

3. Give the first person *singular* of the *future*, and of the *aorist* and *perfect active* of *δάκνω, διασπείρω, ὠθέω, ἀποφεύγω, ἐλέγχω, καταλαμβάνω, ὀλισθάνω, φθάνω.*

δάκνω—*δήξομαι* (mid.), *ἔδακον, δέδηχα.*

διασπείρω—*διασπερῶ, διέσπειρα* (*διέσπαρκα* not found).

ὠθέω—*ὤσω* and *ὠθήσω* (poet.), *ἔωσα, ἔωκα.*

ἀποφεύγω—*ἀποφεύξομαι* (mid.) *ἀπέφυγον, ἀποπέφευγα.*

ἐλέγχω—*ἐλέγξω, ἤγεγξα* (*ἐλήλεγχα* not found).

καταλαμβάνω—*καταλήψομαι* (mid.), *κατέλαβον, κατείληφα.*

ὀλισθάνω—*ὀλισθήσω*, {*ὤλίσθησα* / *ὤλισθον*}, *ὤλίσθηκα.*

φθάνω—*φθάσω* and (mid.) *φθήσομαι*, {*ἔφθασα* / *ἔφθην*}, *ἔφθακα.*

4. Give the Greek words for 'if ever,' 'whither,' 'eighteen' (two ways), 'thirtieth,' 'ten thousand,' 'earlier.'

εἴ ποτε—*ποῖ* (interr.), *ὅποι* (indirect interr.), *οἵ* (rel.)—*ὀκτωκαίδεκα, δυοῖν δέοντες* (declinable) *εἴκοσι(ν)*—*τριακοστός*—*μύριοι* (declinable)—*πρωιαίτερον.*

5. Explain the three instances of *διὰ* with the genitive in Extract A, and give also various meanings of *διὰ* with the accusative.

διὰ φιλίας (ἰέναι)—an adverbial phrase in which the *local* significance of *διὰ* is preserved, 'to pass *through* friendship,' that is 'to be friendly.'

διὰ πιστέως—Here *διὰ* has its *causal* meaning. *Because of* their trustfulness they put themselves into their hands, cp. English *through* in 'he failed *through* inability to speak.'

διὰ παντὸς πολέμου shows the full *local* force of *διὰ* with genitive, viz. *motion through and out of.* Here Xenophon speaks of '*going right through to the end* of every (sort of) war with the Persians.'

διὰ with the accusative :—

1. Local: *διὰ δῶμα*, throughout the house. A poetical use.
2. Temporal: *διὰ νύκτα*, throughout the night, by night.
3. Causal: (*a*) consecutive, *διὰ πολλά*, for many reasons, *δι' Ἀθήνην*, with the help of Athena.
   (*b*) final (a rare use) *διὰ τὴν σφέτεραν δόξαν*, for the sake of their own glory.

6. Translate the following sentences, and remark on the construction of the *spaced* words :—

(1) *κατακείμεθα ὥσπερ ἐξὸν ἡσυχίαν ἄγειν.*

(2) *φθάνουσιν ἐπὶ τῷ ἄκρῳ γενόμενοι τοὺς πολεμίους.*

(3) *ἐν ταὐτῷ γε μέντοι ἦσθα τούτοις.*

(4) *ἀναμνήσω ὑμᾶς καὶ τοὺς τῶν προγόνων κινδύνους.*

(5) *ἐκάθισαν χωρὶς τοὺς ἑκασταχόσε φάσκοντας εἰδέναι.*

(6) *πᾶς γὰρ ἀσκὸς δύο ἄνδρας ἕξει τοῦ μὴ καταδῦναι.*

(1) 'We are lying here as though it were possible for us to remain at ease.' The participles of impersonal verbs (like *ἔξεστι*) stand in the *accusative absolute*, in the neuter singular, when others would be in the genitive absolute.

(2) 'They reach the summit before the enemy.' With *φθάνω* (I anticipate) the participle is used and contains the leading idea of the expression. In this construction the aorist participle does not denote past time in itself, but coincides in time with the verb. The person anticipated in any way is expressed by an accusative, object of *φθάνω*.

(3) 'But at any rate you were in the same plight with them.' The dative may be used with all words implying *likeness* or *sameness* (as *ὁ αὐτός*). After adjectives of likeness, an abridged form of expression is often used (as here), *e.g.*, *κόμαι Χαρίτεσσιν ὁμοῖαι*, hair like (that of) the Graces.

(4) 'I will remind you also of the dangers of your forefathers.' Verbs signifying *to remind* may take two object accusatives (as here, *ὑμᾶς* and *τοὺς κινδύνους*).

(5) 'They set apart those who alleged that they knew the way in every direction.'

(6) 'For each skin will keep two men from sinking.'

III. Questions arising out of the subject :—

1. State briefly the cause of the expedition called the 'Anabasis' and its immediate result. How did it lead to a greater enterprise afterwards?

The cause of the expedition was the purpose of Cyrus the Younger to wrest the throne of Persia from the possession of his brother Artaxerxes.

Its immediate result was the death of Cyrus in the battle of Cunaxa, 401 B.C., and the defeat of his army, although the Greeks were victorious over that part of the enemy which was opposed to them.

The expedition and safe return of the ten thousand destroyed the belief in the strength of the Persian empire. It roused hopes in Greece of revenge for the invasion of Xerxes. Isocrates recommended the invasion of Persia first to the combined force of Greece under Athens and Sparta, and afterwards to Philip of Macedon. Philip cherished the ambition, and from him it passed to his son Alexander, whose famous expedition into Asia took place 334 B.C.

2. Give a very short account of the education and life of Xenophon, and name other works which he wrote.

Xenophon was the son of Gryllus an Athenian. He must have been born about 430 B.C. His own language discredits the tradition that he was present at the battle of Delium (424). He was the pupil and friend of Socrates, and must have had besides a good military, athletic, and literary education. In 401 he joined the army of Cyrus, and after the battle of Cunaxa and the murder of the Greek generals (401), he took the lead in the retreat of the ten thousand. He afterwards served in the Spartan army against the Persians (396), and fought under Agesilaus against the Athenians in the battle of Coronea (394). Sentence of banishment being passed on him by the Athenians he retired to Scillus in Elis, where he lived for many years. He is reported to have died at Corinth, but the date of his death is uncertain. It was later than 357 B.C. The names of other works of Xenophon are, *Memorabilia* (of Socrates), *Hellenica*, *Agesilaus*, *Cyropædia*, *Oeconomicus*, *Symposium*, *Hiero*, *Hipparchicus*, Ἱππική (on the Horse).

3. Draw a sketch-map showing the line of advance and retreat of the Greeks.

[*Our readers will find a map in any good edition of the Anabasis.*]

IV. Passages from Books not prescribed.

1. Ἐπεὶ οὖν ἔγνω ὁ Ἀστυάγης σφόδρα αὐτὸν ἐπιθυμοῦντα[1] ἔξω θηρᾶν,[2] ἐκπέμπει αὐτὸν σὺν τῷ θείῳ,[3] καὶ φύλακας σύμπεμπει ἐφ' ἵππων πρεσβυτέρους, ὅπως ἀπὸ τῶν ἐνσχωρίων[4] φυλάττοιεν αὐτὸν, καὶ εἴ τῶν ἀγρίων τι φανείη θηρίων. ὁ οὖν Κῦρος τῶν ἑπομένων ἐπυνθάνετο ποίοις οὐ χρὴ θηρίοις πελάζειν.[5] οἱ δ' ἔλεγον ὅτι ἄρκτοι τε πολλοὺς ἤδη πλησιάσαντας[5] διέφθειραν καὶ κάπροι καὶ λέοντες, αἱ δὲ ἔλαφοι καὶ δορκάδες[6] καὶ οἱ ἄγριοι οἷες ἀσινεῖς[7] εἰσίν.

[1] ἐπιθυμεῖν, to desire; [2] θηρᾶν, to hunt; [3] θεῖος, uncle; [4] ἐνσχώρια, rough ground; [5] πελάζειν, πλησιάζειν, to approach; [6] δορκάς, gazelle; [7] ἀσινής, harmless.

When therefore Astyages learnt that he was very eager to hunt in the open country, he sent him out with his uncle, and sent with them, as guards, older men on horseback, that they might guard him from venturing upon dangerous ground, or if any wild beast should appear. Cyrus therefore used to enquire from those who attended him what kinds of beasts one ought not to approach. And they used to tell him that bears and boars and lions had ere then destroyed many who came near them, whilst deer and gazelles and wild sheep were harmless.

2. δύτ', ὦ τεκν', αὐτοῖς χεῖρα δεξίαν ἐόντε.
ὑμεῖς δὲ παισὶ, καὶ πέλας προσέλθετε.
ὦ παῖδες, ἐς μὲν πεῖραν[1] ἦλθομεν φίλων,
ἦν δ' οὖν ποθ' ὑμῖν νόστος[2] ἐς πάτραν φανῇ,
καὶ δῶμαθ' οἰκήσητε καὶ τιμὰς πατρὸς,
σωτῆρας ἀεὶ καὶ φίλους νομίζετε,
καὶ μηποτ' ἐς γὴν ἐχθρὸν αἴρεσθαι δόρυ,
μεμνημένοι τῶνδ', ἀλλὰ φιλτάτην πόλιν
πασῶν νομίζετ'.

[1] πεῖρα, trial; [2] νόστος, return.

Give them, O my children, give them your right hands, and do you give yours to my sons, and come near. O my sons, we are come to the testing of friends, and if ever your way become clear to return to your fatherland, and you take possession of your homes and your father's honours, do you reckon these men ever your saviours and your friends, and never lift hostile spear against their land, but be mindful of these men, and reckon their city the dearest of all.

FRENCH.

Tuesday, 10 to 1.

Examiners—Henri Bué, Esq., B.-ès-L.,
J. A. Leriche, Esq., B.A., B.Sc.

I. Translate into English the FIRST (*A.*), *and either the* SECOND (*B.*), *or the* THIRD (*C.*), *of the following extracts :—*

A.

Premières lectures de William Cobbett.

Fils d'un petit fermier actif, industrieux et honnête, W. Cobbett dès son enfance gagnait laborieusement sa vie. Mais, tout en conduisant un attelage ou en suivant sa charrue, l'enfant pensait à beaucoup de choses. A onze ans déjà, il avait un goût décidé pour la lecture et de vagues inquiétudes, . . . il cherchait sa destinée. Un jour, un jardinier de Farnham qui l'employait lui fit une pompeuse description de la ville de Kew ; il se mit en tête d'aller voir Kew. Le lendemain matin il visita sa poche, y trouva jusqu'à treize sous, et, vêtu d'un petit sarrau bleu, des jarretières rouges nouées autour du genou, il s'échappa. Comme, le nez en l'air, il traversait Richmond, par une belle soirée de Juin, il avisa, à l'étalage d'un libraire, un petit volume intitulé 'Le Conte du Tonneau.' Il n'avait plus tous les sous ; il en avait dépensé six, il en avait perdu un, et le volume en coûtait cinq. S'il l'achetait, adieu son souper. Il n'hésita pas longtemps, et, son petit livre à la main, il entra dans un champ où il s'assit au pied d'une meule de foin. 'Ce livre ne ressemblait à rien de ce que j'avais eu jusqu' alors,' rapporte-t-il ; 'c'était pour moi quelque chose de si nouveau que, sans en comprendre la moitié, j'éprouvais la jouissance la plus vive. . . . Je lus jusqu' à la nuit, sans penser à souper ni à me coucher. Quand le sommeil s'empara de moi, je me laissai tomber sur la meule de foin, et je dormis jusqu'au moment où les oiseaux m' éveillèrent.' Le premier livre qui avait fait battre le cœur à W. Cobbett était un pamphlet célèbre. Ce futur radical était à mille lieues de soupçonner qu'il deviendrait, lui aussi, un éloquent pamphlétaire, ressemblant à Swift autant que peut ressembler à un oiseau de haut vol celui qui se plait dans les régions basses et aime à regarder la terre de près. G. VALBERT

Early Reading of William Cobbett.

The son of an active, industrious, and upright small farmer, William Cobbett from his childhood had to work hard for his living. But the child, as he led his team or followed the plough, used to think upon many things. Even at the age of eleven he had a decided taste for reading as well as certain vague feelings of restlessness . . . he was considering what his future should be. One day a Farnham gardener, in whose employ he was, gave him a glowing description of the town of Kew ; he made up his mind to go and see Kew. Next morning he examined his pockets and finding there just sixpence-halfpenny, he set off, clad in a small blue smock, with red garters tied round his knees. As he passed through Richmond on a fine June evening, his eyes all about him, he noticed in a bookseller's window a small volume, entitled 'The Tale of a Tub.' He had not now his thirteen halfpence ; six of them he had spent, one he had lost, and five was the price of the volume. If he bought it, good bye to his supper. He did not hesitate long, and then, with his little book in his hand, he entered a field and sat down beside a haycock. 'That book,' he tells us, 'was like nothing that I had ever read ; it was to me something so new that, without understanding one-half of it, I experienced a most lively delight in it. I read on until night time, without a thought of supper or rest. When sleep overpowered me I fell back upon the haycock, and slept until the birds awakened me.' The first book which had caused William Cobbett's heart to beat faster was a famous pamphlet. This Radical, as he was to be, was far enough from suspecting that he too would become an eloquent pamphleteer, who should resemble Swift as far as a bird that delights in lower flights and loves a near view of the earth can resemble a bird of lofty wing.

B.

L'arbitrage substitué à la guerre.

La guerre est le plus déplorable emploi qu'on puisse faire des forces et des facultés humaines. Elle détruit en quelques mois des capitaux qu'on met quelques années à produire ; elle moissonne impitoyablemement la fleur de la population ; elle entretient les haines entre les peuples. La guerre méconnait une loi que la science moderne a complètement mise en évidence, celle de la solidarité des intérêts entre les nations comme entre les individus ; celui qui nuit à son prochain se nuit en même temps à lui-même. Elle ne supprime un mal qu'en créant un mal équivalent. Renverse-t-elle une puissance menaçante, elle en élève une autre qui menace tout autant la paix générale. Sans doute il serait prématuré d'attendre le règne indéfini de la paix ; mais il n'est pas défendu de le hâter par nos vœux. De grands progrès se sont déjà accomplis dans ce sens. Autrefois la guerre était une maladie chronique des nations ; la paix ne se montre que comme une courte exception dans l'histoire. Maintenant, au contraire, la guerre ne saurait être que de brève durée, et la paix est pour tous les peuples une nécessité qu'ils ne peuvent longtemps méconnaître. D'un autre côté les jugements par arbitres entre les Etats commencent à remplacer dans biens des cas les contestations à main armée ; progrès sensible de la morale internationale. Il est digne d'un grand état d'accepter de bonne grâce la décision d'un grand tribunal qui le condamne. N'est-ce pas plus digne en effet que de se déclarer juge de sa propre cause, d'appeler à son aide les *canons* à défaut de *raisons ?*

Arbitration instead of War.

War is the most deplorable use which can be made of human forces and faculties. It destroys in a few months capital which it took years to create ; it mows down pitilessly the flower of the population ; it keeps hatred alive between nation and nation. It ignores a law which modern science has completely demonstrated, namely, the *solidarity* of the interests of nations as of individuals : he who wrongs his neighbour, at the same time wrongs himself. War suppresses one evil only by raising up another equally bad. If it throws down one menacing power, it sets up another which is no less a menace to the general peace. Without doubt it would be premature to expect the universal reign of peace, but we are not forbidden to hasten its coming by our prayers. A great advance has already been made in this direction. In former times war was a chronic malady of the nations ; peace only appears as a brief interlude in history. Now, however, war can continue to exist but a short time longer, and for all nations peace is a necessity which they cannot long ignore. Meanwhile arbitrations between States begin in a number of cases to take the place of settlements by main force of arms : an obvious advance in international morality. It is worthy of a great State to accept with a good grace the decision of a great tribunal which condemns it. Is it not really more worthy than to declare itself the judge of its own cause, and call *cannons* to its aid in default of *reasons?*

C.

Le Requiem de Mozart.

Un jour que Mozart était plongé dans une profonde rêverie, il entendit un carrosse s'arrêter à sa porte. On lui annonce un inconnu qui demande à lui parler ; il voit entrer un homme d'un certain âge, fort bien mis, les manières les plus nobles, et même quelque chose d'imposant : 'Je suis chargé, monsieur, par un homme très considérable, de venir vous trouver. Quel est cet homme ? interrompit Mozart. 'Il ne veut pas être connu. A la bonne heure ! et que désire-t-il ? Il vient de perdre une personne qui lui était bien chère, et dont la memoire lui sera éternellement précieuse ; il veut célébrer tous les ans sa mort par un service solennel, et il vous demande de composer un *Requiem* pour ce service.' Mozart se sent vivement frappé de ce discours, du ton grave dont il est prononcé, de l'air mystérieux qui semble répandu sur toute cette aventure : il promet de faire le *Requiem.* L'inconnu continue : 'Mettez à cet ouvrage tout votre génie ; vous travaillez pour un connaisseur en musique. Tant mieux. Combien de temps demandez-vous ? Quatre semaines. Eh bien ! Je reviendrai dans quatre semaines. Quel prix mettez-vous à ce travail ? Cent ducats.' L'inconnu les compte sur la table et disparaît. Mozart reste plongé quelques moments dans de profondes réflexions, puis, tout à coup, demande une plume, de l'encre, du papier, et, malgré les remonstrances de sa femme, il se met à écrire. Cette fougue de travail dura plusieurs jours ; il composait jour et nuit, et avec une ardeur qui semblait augmenter en avançant ; mais son corps, déjà faible, ne put résister à cet enthousiasme : un matin, il tomba sans connaissance, et fut obligé de suspendre son travail. Deux ou trois jours après, sa femme cherchant à le distraire des sombres pensées qui l'occupaient, il lui répondit brusquement : 'Cela est certain, c'est pour moi que je fais ce *Requiem ;* il servira à mon service mortuaire.' Rien ne put le détourner de cette idée.

DE STENDHAL.

Mozart's Requiem.

One day when Mozart was buried in deep reverie, he heard a carriage stop at his door. A stranger was announced who desired to speak to him. He saw entering an elderly gentleman, very well dressed, with manners most courteous, and even somewhat commanding. 'I am desired, Sir, by a gentleman of some eminence to come and see you.' 'Who is the gentleman ?' interrupted Mozart. 'He does not wish to be known.' 'Very good, and what does he want ?' 'He has recently lost one who was very dear to him, and whose memory will be for ever precious to him ; he wishes to celebrate his death every year by a solemn service, and he desires you to compose a *Requiem* for this service.' Mozart was greatly impressed by these words, and the grave tone in which they were uttered, and the air of mystery which seemed to surround the whole occasion : he promised to compose the *Requiem.* The stranger continued : 'Put into this work all your genius ; you are working for a *connoisseur* in music.' 'So much the better.' 'How much time do you desire ?' 'Four weeks.' 'Well, I shall return in four weeks. What price do you put upon this work ?' 'A hundred ducats.' The stranger counted them upon the table and disappeared. Mozart remained buried in deep thought for some moments, then called suddenly for pen, ink, and paper, and, in spite of the remonstrances of his wife, began to write. This fury of work lasted for several days ; he composed day and night, and with a fervour which seemed to increase every hour ; but his body, already enfeebled, could not sustain this enthusiasm : one morning he fell down unconscious, and was obliged to relinquish his work. Two or three days after, when his wife was seeking to divert him from the melancholy thoughts which possessed him, he answered abruptly : 'This is certain, it is for myself that I am composing this *Requiem ;* it will serve for my funeral service.' Nothing could dissuade him from this idea.

II. *Grammar.*—Answer *seven*, but not more than *seven*, of the following questions :—

1. Turn into—

(*a*) the plural : *un sarrau bleu, un mal équivalent, un bal costumé, le pari-mutuel ;*

(*b*) the singular : *des capitaux immenses, d'immenses capitales, des lieux de plaisance, des lieues de mer, des oiseaux de paradis, les uns sur les autres ;*

(*c*) the masculine : *des jeunes filles naïves, des nations belliqueuses.*

(*a*) des sarraux bleus, des maux équivalents, des bals costumés, les paris-mutuels.

(*b*) un capital immense, une immense capitale, un lieu de plaisance, une lieue de mer, un oiseau de paradis, l'un sur l'autre.

(*c*) des jeunes gens naïfs, des peuples belliqueux.

2. Give—

(*a*) the present participle of: *médire, maudire, faire, connaître;*

(*b*) the past participle of: *souffrir, écrire, savoir, naître, vêtir;*

(*c*) The future indicative (1st person singular only) of: *payer, envoyer, employer, voir;*

(*d*) the present indicative (2nd and 3rd persons singular only) of: *prendre, joindre, coudre, résoudre.*

(*a*) médisant, maudissant, faisant, connaissant.

(*b*) souffert, écrit, su, né, vêtu.

(*c*) je paierai, payerai, or paîrai, j'enverrai, j'emploierai, je verrai.

(*d*) tu prends, il prend, tu joins, il joint, tu couds, il cond, tu résous, il résout.

3. Form adverbs with *nul, bon, doux, complet, franc, sérieux, actif, gras, méchant, lent, aveugle, petit, joli,* and state the chief rules of formation.

Nullement, bien (well) and bonnement (simply), doucement, complétement, franchement, sérieusement, activement, grassement, méchamment, lentement, aveuglément, peu and petitement, joliment.

The chief rules (ignoring exceptions) are—

i. The suffix *-ment* is added to adjectives ending in a vowel. *Vrai, vraiment.*

ii. The suffix *-ment* is added to the feminine form of adjectives ending in a consonant. *Long, longuement.*

iii. But in adjectives ending in *-ant, -ent,* these terminations are changed into *-amment, -emment* respectively. *Prudent, prudemment.*

4. Rewrite—

(*a*) in the past indefinite (a compound tense): *Elles s'en allèrent. Qu'en résulterait-il? Ils ne partirent pas tous ensemble;*

(*b*) in the past conditional (a compound tense): *Que deviendrait-elle? Ceux qui arriveraient. Celui qui courrait.*

(*a*) Elles s'en sont allées. Qu'en a-t-il resulté? Ils ne sont pas partis tous ensemble.

(*b*) Que serait-elle devenue? Ceux qui seraient arrivés. Celui qui aurait couru.

5. Correct, if necessary, and justify your corrections:—

(*a*) Personne ne lui est *supérieure.* Cette personne lui est *supérieur.*

(*b*) Il en a vu bien *des* autres. Il lui a donné bien *d'*argent.

(*c*) *Quelques* soient ses torts. *Quels que* torts qu'il ait.

(*d*) Ne demandez-*le-lui* pas. *Le lui* demandez.

(*a*) Personne ne lui est *supérieur. Personne,* meaning *nobody, no one* is always masculine.

Cette personne lui est *supérieure. Personne* in the sense of *a person* (man or woman) is always feminine, and adjectives in agreement with it, whether attributive (as *cette*) or predicative (as *supérieure*) must be feminine.

(*b*) Il en a vu bien *d'*autres. Il lui a donné bien *de l'* argent. Substantives of quantity are followed by *de,* except *bien* and *la plupart,* which are followed by *de with the article.* But with the word *autres,* the idiom is *bien d'autres, many others.*

(*c*) *Quels que* soient ses torts. *Quelques* torts qu'il ait. If *whatever* agrees with a noun, which is the subject of the verb *to be,* it is rendered in French by *quel que* (declinable), and must immediately be followed by the subjunctive of *être.* In other cases *whatever* is rendered by *quelque* (plur. *quelques*), with *que* before the verb.

(*d*) Ne *le lui* demandez pas. With the imperative used negatively, the pronouns precede the verb, and no hyphen is required. *Lui* always follows *le, la, les.*

Demandez-*le-lui.* When the imperative is used *affirmatively,* the pronouns are placed after it, with hyphens.

6. Make—

(*a*) interrogative: *je pars, je bois, je ris, je pleure, je m'ennuie;*

(*b*) negative: *j'y consens, j'y suis allé;*

(*c*) negative-interrogative: *je m'en sers, je m'y connais.*

Conjugate in full.

(*a*) negatively, the tense: *je me le rappelle;*

(*b*) interrogatively-negatively: *je m'en serais abstenu.*

(*a*) *Est-ce que je pars? Pars-je,* though grammatically correct, would never be used.

Est-ce que je bois? or *bois-je?*
Est-ce que je ris? or *ris-je?*
Pleuré-je?
Est-ce que je m'ennuie, or *m'ennuié-je?*

(*b*) *je n'y consens pas. Je n'y suis pas allé.*

(*c*) *n'est-ce pas que je m'en sers?* Ne m'en sers-je pas? is grammatically possible.

Ne m'y connais-je pas?

(*a*) Je ne me le rappelle pas.
tu ne te le rappelles pas.
il or elle ne se le rappelle pas.
nous ne nous le rappelons pas.
vous ne vous le rappelez pas.
ils or elles ne se le rappellent pas.

(*b*) Ne m'en serais-je pas abstenu.
ne t'en serais-tu pas abstenu.
ne s'en serait-il or pas abstenu.
ne nous en serions-nous pas abstenus.
ne vous en seriez-vous pas abstenus.
ne s'en seraient-ils or pas abstenus.

7. Complete the following sentences, by translating into French the English words which are printed between brackets:—

(1) *Voici la lettre* (to which) *j'ai fait allusion.*
(2) *Il ne croit pas* (what) *nous lui disons.*
(3) *Je ne sais pas* (of whom) *vous parlez.*
(4) *Demandez-lui* (at what) *heure il ira voir* (these) *dames?*
(5) *Est-ce là le livre* (which) *vous avez acheté?*
(6) *Voici le journal* (of which) *il a besoin.*

(1) à laquelle; (2) ce que; (3) de qui; (4) à quelle . . . ces; (5) que; (6) dont.

8. Re-write, with every noun (or every leading pronoun), and its dependencies—

(*a*) in the plural: *Une loi que la science moderne a mise en évidence.—Celui qui nuit à son semblable se nuit à lui-même.—Mon ami vient de perdre une personne qui lui était chère;*

(*b*) in the singular: *De grands progrès se sont accomplis.—Ils appelèrent leurs voisins à leur aide.—Les chants que nous entendîmes nous éveillèrent.*

(*a*) Des lois que les sciences modernes ont mises en évidence.
Ceux qui nuisent à ses semblables se nuisent à eux-mêmes.
Mes amis viennent de perdre des personnes qui leur étaient chères.

(*b*) Un grand progrès s'est accompli.
Il appela son voisin à son aide.
Le chant que j'entendis m'éveilla.

9. Write down the following sentences, changing the infinitives into past participles:—

(*a*) Et s'ils avaient *suivre* mes conseils et mes vœux,—Je les aurais *sauver* ou *combattre* tous deux.

(*b*) . . . à ce discours, ces héros *irriter*—L'un sur l'autre à la fois se sont *précipiter.*

(*c*) Voyez cette multitude d'yeux dont la nature s'est *plaire* à ceindre la tête de la mouche.

(*d*) Quelles dures vérités ils se sont *dire!*

(*e*) Les violents orages qu'il y a *avoir* et qui ont été *causer* par les grandes chaleurs qu'il a *faire,* ont *ravager* tout le pays.

(*a*) Et s'ils avaient *suivi* mes conseils et mes vœux,
Je les aurais *sauvés* ou *combattus* tous deux.

(*b*) . . . à ce discours, ces héros *irrités*
L'un sur l'autre à la fois se sont *precipités*.

(*c*) Voyez cette multitude d'yeux dont la nature s'est *plu* à ceindre la tête de la mouche.

(*d*) Quelles dures vérités ils se sont *dites!*

(*e*) Les violents orages qu'il y a *eu* et qui ont été *causés* par les grandes chaleurs qu'il a *fait*, ont *ravagé* tout le pays.

10. Translate into English :—

(*a*) *Je le ferai dans quatre semaines. Je le ferai en quare semaines. Je commencerai d'aujourd'hui en huit. Il est parti il y a huit jours. Je ne travaillerai que tous les deux jours.*

(*b*) *De bonne heure, par bonheur, tant mieux, de mal en pis, tant pis, pas le moins du monde, venez plutôt trop tôt que trop tard.*

(*a*) I shall do it in four weeks, that is, *four weeks hence.* I shall do it in four weeks, that is, *within the space of four weeks.* I shall commence this day week. He has been gone these eight days. I shall only work every other day.

(*b*) Betimes or early, happily or luckily, so much the better, from bad to worse, not in the least, come rather too soon than too late.

ARITHMETIC AND ALGEBRA.

Tuesday, 2 to 5.

Examiners—Prof. Horace Lamb, M.A., F.R.S.,
Joseph Larmor, Esq., D.Sc., M.A.

1. Find the number of metres in a mile, given that a metre is 39·37 inches; also find the number of miles in ten million metres.

$$
\begin{array}{l}
39{\cdot}37\overset{\frown}{)}63360{\cdot}00\overset{\frown}{\cdot}\,|\,000(1609{\cdot}347\ldots \\
\quad 3937 \\
\quad 23990 \\
\quad 23622 \\
\quad 36800 \\
\quad 35433 \\
\quad 1367\,|\,0 \\
\quad 1181\ 1 \\
\quad 18590 \\
\quad 15748 \\
\quad 28420 \\
\quad 27559
\end{array}
$$

1 metre = 39·37 inches.
1 mile = 63,360 inches.
∴ 1 mile = 1609·35 inches.

$$
\begin{array}{l}
1609{\cdot}347\overset{\frown}{)}10000000{\cdot}000\overset{\frown}{\cdot}\,|\,000(6213{\cdot}762\ldots \\
\quad 9656082 \\
\quad 3440180 \\
\quad 3218694 \\
\quad 2214860 \\
\quad 1609347 \\
\quad 6055130 \\
\quad 4828041 \\
\quad 1227089\,0 \\
\quad 1126542\,9 \\
\quad 10054610 \\
\quad 9656082 \\
\quad 398528
\end{array}
$$

1 mile = 1609·347 metres.
∴ 10,000,000 metres = 6213·76 miles.

2. Archimedes proved that the ratio of the circumference of a circle to its diameter lies between $3\frac{1}{7}$ and $3\frac{10}{71}$; within how much per cent. could he have been sure of the correct value by using the mean of these two numbers? [The answer is to be correct to two significant figures.]

$$
\begin{array}{l}
71)100(\cdot140845070\ldots \\
\quad 71 \\
\quad 290 \\
\quad 284 \\
\quad 600 \\
\quad 568 \\
\quad 320 \\
\quad 284 \\
\quad 360 \\
\quad 355 \\
\quad 500 \\
\quad 497 \\
\quad 3
\end{array}
$$

$$
\begin{array}{l}
3{\cdot}142857142\ldots \\
3{\cdot}140845070\ldots \\
2)6{\cdot}287202212\ldots \\
3{\cdot}141851106 \\
3{\cdot}140845070 \\
\cdot001006036
\end{array}
$$

The proved limits of the value of π were—
3·142857 and 3·140845070 . . .
The mean of these is 3·1410851106 . . .
Using this value, the greatest error possible would be—
3·142857142 . . − 3·141851106 . . .
or 3·141851106 . . − 3·140845070 . . .
= ·001006036 . .

In the value 3·141851106 . . . the greatest possible error is ·00100636, therefore the possible error per cent. is

$$\frac{\cdot001006036 \times 100}{3{\cdot}1418511062} = \cdot03202\ldots.$$

$$
\begin{array}{l}
3{\cdot}141851106\overset{\frown}{\cdot})\overset{\frown}{100603600\cdot}\,|\,000(\cdot03202 \\
\quad 94255533\ \ 18 \\
\quad 6348\,0668\ \ 20 \\
\quad 6283\,7022\ \ 12 \\
\quad 643646\ \ 08
\end{array}
$$

Therefore Archimedes could have been sure within ·032 per cent.

3. A merchant mixes two qualities of tea in the proportion of two parts of the cheaper to one of the dearer, and by selling the mixture at 2s. 11d. per pound he gains a profit of 25 per cent.; on mixing them in the proportion of three parts of the cheaper to two parts of the dearer, and selling the mixture at 3s. per pound, he gains the same rate of profit. Find the prices at which he bought.

Call the cheaper tea T_1, and the dearer T_2.
(1) Call the first mixture M_1; its cost price was $\frac{100}{125}$ of 35 = 28d.
(2) Call the second mixture M_2; its cost price was $\frac{100}{125}$ of 36 = 28·8d.
(3) From (1), 2 lbs. of T_1 with 1 lb. of T_2 cost 84d.
(4) From (2), 3 lbs. of T_1 with 2 lbs. of T_2 cost 144d.
(5) From (3) and (4), 1 lb. of T_1 with 1 lb. of T_2 cost 60d.
(6) From (3) and (5), 1 lb. of T_1 cost 24d. and 1 lb. of T_2 cost 36d.
He bought the teas at 2s. and 3s. per pound respectively.

4. Multiply out $(x - y)^3$.

Deduce that the cube of the difference of two positive numbers is always less than the difference of their cubes.

$$
\begin{array}{l}
x - y \\
x - y \\
\hline
x^2 - xy \\
\quad - xy + y^2 \\
\hline
x^2 - 2xy + y^2 \\
x - y \\
\hline
x^3 - 2x^2y + xy^2 \\
\quad - x^2y + 2xy^2 - y^3 \\
\hline
x^3 - 3x^2y + 3xy^2 - y^3.
\end{array}
$$

Let x and y be two positive numbers, and let x be the greater.

Then $(x - y)$, $x^2 - y^2$, xy and $(x - y)^3$ are all positive. $(x - y)^3 = x^3 - y^3 - 3xy\,(x - y)$.

∴ $(x - y)^3$ is greater than $x^3 - y^3$ by $3xy\,(x - y)$, or the cube of the difference is always greater than the difference of the cubes of two positive numbers.

5. Calculate $7894^3 - 7891^3$.

Expand $(a-b)(b-c)(c-a)(a+b+c)$

$$7894^3 - 7891^3 = (7894 + 7891) \times (7894 - 7891)$$
$$= 15785 \times 3$$
$$= 47355.$$
$$(a-b)(b-c)(c-a)(a+b+c).$$

By inspection it is clear (1) that the expansion will be symmetrical with regard to a, b, and c; (2) that each term will be of four dimensions; (3) that terms like a^3bc and a^2b^2 will vanish. This leaves for the product $ab^3 - a^3b + bc^3 - b^3c + ca^3 - c^3a$.

6. Prove that $(a+b+c)^3 - a^3 - b^3 - c^3$ is divisible by $(a+b)$, and find the remaining factors.

Simplify— $\dfrac{(a^3-b^3)^3 + (b^3-c^3)^3 + (c^3-a^3)^3}{(a+b+c)(ab+bc+ca) - abc}$

$(a+b+c)^3 - a^3 - b^3 - c^3$

$= a^3 + b^3 + c^3 + 3a^2b + 3ab^2 + 3a^2c + 3ac^2 + 3b^2c + 3bc^2 + 6abc - a^3 - b^3 - c^3.$

$= 3(a^2b + ab^2 + a^2c + ac^2 + b^2c + bc^2 + 3abc)$

$= 3[ab(a+b) + bc(a+b) + ca(a+b) + c^2(a+b)]$

$= 3(a+b)(ab+bc+ca+c^2)$

$= 3(a+b)(b+c)(c+a)$

Hence $(a+b)$ is a factor, and the others are 3, $(b+c)$, and $(c+a)$.

Utilising these results, we may write down that $x^3 + y^3 + z^3 = (x+y+z)^3 - 3(x+y)(y+z)(z+x)$.

Writing $a^3 - b^3$ for x, $b^3 - c^3$ for y, $c^3 - a^3$ for z, we have that the numerator of the fraction, viz., $(a^3-b^3)^3 + (b^3-c^3)^3 + (c^3-a^3)^3$

$= (a^3 - b^3 + b^3 - c^3 + c^3 - a^3)^3 - 3(a^3 - b^3 + b^3 - c^3)(b^3 - c^3 + c^3 - a^3)(c^3 - a^3 + a^3 - b^3)$

$= 3(a^3 - b^3)(b^3 - c^3)(c^3 - a^3),$

and the denominator

$(a+b+c)(ab+bc+ca) - abc$

$= (a+b)(ab+bc+ca) + c(ab+bc+ca-ab)$

$= (a+b)(ab+bc+ca) + c^2(b+a)$

$= (a+b)(ab+bc+ca+c^2)$

$= (a+b)(b+c)(c+a).$

Hence the whole fraction

$$= \frac{3(a+b)(b+c)(c+a)(a-b)(b-c)(c-a)}{(a+b)(b+c)(c+a)}$$
$$= 3(a-b)(b-c)(c-a).$$

7. Solve the equations—

(i.) $\dfrac{3}{x-2} - \dfrac{x+1}{4-x} = 1,$

(ii.) $(x-a)(x-b) = (a+b-x)^2.$

(i.) $\dfrac{3}{x-2} - \dfrac{x+1}{4-x} = 1$

$\therefore \dfrac{3}{x-2} + \dfrac{x+1}{x-4} = 1$

$\therefore 3x - 12 + x^2 - x - 2 = x^2 - 6x + 8$

$\therefore 8x = 22$ and $x = 1\frac{1}{4}$.

(ii.) $(x-a)(x-b) = (a+b-x)^2$

$\therefore x^2 - ax - bx + ab = a^2 + b^2 + x^2 + 2ab - 2bx - 2xa.$

$\therefore x(a+b) = a^2 + ab + b^2$

and $x = \dfrac{a^2+ab+b^2}{a+b}$.

8. Given an example of a vulgar fraction such that the equivalent decimal has an infinite number of figures; and show that the significant figures must always repeat themselves before their number becomes as great as the denominator.

Find the exact product of 12·3 and 8·045.

$\frac{3}{7} = \cdot 428571428571\ldots$*ad infinitum.*

In reducing to a decimal, 7 is the divisor and the remainders are 3, 2, 6, 4, 5, 1, 3, 2, 6, 4, 5, 1…*ad infinitum.*

The number of significant figures in the quotient depends upon the number of remainders. Evidently for any divisor x there cannot be more than $x-1$ different remainders, and as soon as there are $x-1$ significant figures in the quotient, if not before, the remainders must begin to recur. Hence the significant figures must always, &c.

$$12\cdot3 \times 8\cdot045 = 12\tfrac{3}{10} \times 8\tfrac{45}{1000}$$
$$= 12\tfrac{3}{10} \times 8\tfrac{9}{200}$$
$$= \tfrac{123}{10} \times \tfrac{1609}{200} = \frac{37 \times 59}{22}$$
$$= 99\cdot22\dot{7} \qquad \begin{array}{l} 2)2183 \\ 11)1091\cdot5 \\ \hline 99\cdot22727. \end{array}$$

9. Find under what circumstances a geometric series admits of being summed to infinity. In a series of which the first term is unity, and each term is one-third of the preceding, find how many terms must be added together that the sum may differ from $1\frac{1}{2}$ only at the sixth place of decimals.

Adopting the usual notation, the sum of a geometric series to n terms is $\dfrac{ar^n - a}{r-1}$. If n be infinitely great, r^n cannot be calculated, unless r is less than 1.

If r is less than 1, r^n becomes infinitely small, and $\Sigma = \dfrac{-a}{r-1} = \dfrac{a}{1-r}$.

Hence a geometric series may be summed to infinity *when the constant ratio is less than* 1.

The series given is $1 + \frac{1}{3} + \frac{1}{3^2} + \ldots$

Let n be the number of terms required.

The sum to n terms is $\dfrac{1 - \frac{1}{3^n}}{1 - \frac{1}{3}} = \frac{3}{2}\left(1 - \frac{1}{3^n}\right)$

The difference between this and $\frac{3}{2}$ is

$$\frac{3}{2} - \frac{3}{2}\left(1 - \frac{1}{3^n}\right) = \frac{3}{2} \cdot \frac{1}{3^n} = \frac{1}{2} \cdot \frac{1}{3^{n-1}}$$

A value of n is required such that

$\dfrac{1}{2} \cdot \dfrac{1}{3^{n-1}}$ may lie between ·000001 and ·00001

or $\dfrac{1}{3^{n-1}}$ between $\frac{1}{500000}$ and $\frac{1}{50000}$.

The powers of 3 are 3, 9, 27, 81, 243, 729, 2187, 6561, 19683, 59049…

$\therefore \dfrac{1}{3^{10}}$ lies between $\frac{1}{300000}$ and $\frac{1}{30000}$.

Hence $n - 1 = 10$ gives the required value of n and 11 *terms of the series must be added.*

10. Solve the equation $36x^2 - 17x - 35 = 0$.

A square is cut off from a rectangular field one mile long by a boundary parallel to the breadth of the field, and the remaining part is one-sixth of a square mile; find the breadth of the field to the nearest yard.

$36x^2 - 17x - 35 = 0$

$\therefore (9x+7)(4x-5) = 0$

$\therefore x = -\frac{7}{9}$ or $\frac{5}{4}$.

Let x be the breadth of the field in miles.

Then x is the area of the field in square miles, and x^2 is the area of the part cut off in square miles.

$\therefore x - x^2 = \frac{1}{6}$

$\therefore x^2 - x + \frac{1}{4} = \frac{1}{4} - \frac{1}{6} = \frac{1}{12}$

$\therefore x - \frac{1}{2} = \pm \dfrac{1}{2\sqrt{3}} = \pm \dfrac{\sqrt{3}}{6}$

$\therefore x = \frac{1}{2}(3 \pm \sqrt{3})$

$$\begin{array}{l} 3 \\ 1\cdot732\ldots = \sqrt{3} \\ \hline 6)4\cdot732 \text{ or } 1\cdot268 \end{array}$$

·7886 or ·2113 are the two values of x in miles (long measure)

1760	1760
47316	12678
55202	14791
7886	2113
1387·936	371·888

The breadth of the field to the nearest yard is 1388 yards or 372 yards.

The remainder of the Model Answers will appear in our next issue.

RECENT INSPECTION OF AN 'EXCELLENT' SCHOOL.

BOYS' DEPARTMENT. (*First Day.*)

ALL the scholars were assembled punctually at half-past eight. Out of 253 on books only one was absent, and for him a medical certificate had been kindly forwarded by the parent. The room was enlivened by a plethora of flowers and plants which eager scholars had profusely brought.

In all the standards the materials and apparatus required were distributed by a quarter to nine, and blackboards, easels, and modulators (Tonic sol-fa) were close at hand. Every scholar had all the papers he might *possibly* require, a copy of each reading-book, and also his *copy-book*. These were neatly warehoused in the desks in front of each scholar. Slates were completely banished.

A fortnight previously most carefully graduated lists of all the scholars in their general order of merit had been drawn up, no child being presented in different standards.

From these lists for each standard three other lists were compiled, having an equal number of excellent, good and fair scholars in each. Thus in each standard we had Groups A, B, and C. Every class teacher was supplied with these Group lists, which turned out to be very serviceable to, and much valued by the Inspectors.

Upon every scholar was prominently placed a parchment ticket showing his standard, his group, and his schedule number.

The following form had also been prepared, and was handed over to the Government officials :—

S. Michael's Boys' School, Northfield.

1. *Report for Year ended 30th Sept. 1890.* 'The school continues excellent, the singing exhibits considerable taste and training, and the specifics were exceedingly well done.
2. *Boys promoted two standards during Year ended 30th Sept. 1891* - 32
3. *Boys retained in same standard* - 7
4. *Result of last Drawing Examination* Excellent Grant awarded.
5. *Scholarship gained* - - - - John Smith, value £27, at King Edward's Grammar School, Southfoss.
6. *No. present on Inspection day* - - 252
7. *No. absent* " " - - 1 Medical Certificate forwarded.

The names were arranged on the schedule according to these groups, A of course coming first, and so on.

A few minutes before nine entered three Inspectors, who were met at the door with a courtesy they fully reciprocated. Not a moment was wasted ; the scholars were greeted with a cheerful '*Good-morning, boys,*' to which, arising, they promptly replied '*Good-morning, sir !*'

The rendering was then heard of two songs in four parts, viz., '*All among the Barley*' and '*The pic-nic gloe,*' Standards I. and II. singing other songs in two parts only.

Division IV., comprising Standards V., VI., and VII., was then severely but not unjustly examined in the Minor Mode, the Time Tests, Bridge Notes, and the Ear Tests.

Music Tests.

DIVISION II. (*Standards I. and II.*)—

Time Test : | 1:1 | 1:1 | 1:- | 1:- | 1:1 | 1:1 | 1:- | 1:- | 1:1 | 1:- | 1:1 | 1:- | 1:1 | 1:1 | 1:1 | 1:- ‖

Tune Test (from the modulator) :

Key G. d m r d s f m d d^{1} m f s m d.

Key B♭ d m_{1} f_{1} m_{1} s_{1} d t_{1} l_{1} t_{1} d.

Ear Test (sung twice by examiner, and imitated by children).

Key F, r d t_{1} ; *Key A,* f s l

DIVISION III. (*Standards III. and IV.*)—

Time Test :

| 1:1:1 | 1:- :- | 1:1:1 | 1:: | 1:1:1 | 1:1.1:1 | 1:1:1 | 1:1:1 ‖

Tune Test (1) *(from the modulator) :*

d m s l s fe fe s s m l d^{1} d^{1} ta l s f m f f m r d

(2) *(from blackboard) :*

| d : m | d^{1} : l | s : s | f : m | f : r | d : l | s : m | r : d ‖

Ear Test (*sung twice by examiner,* after giving the doh chord) :

Key F. m s l s

Key A. d l_{1} t_{1} d

The answers were taken verbally.

DIVISION IV.—

Time Test (sung by scholars from blackboard)

| 1:1:1 | 1:1.1:1 | 1:1:1 | 1:-.1:1 | 1:1:1 | 1: : | 1:1:1 | 1:- :- ‖

Tune Test from blackboard :

d m s r ^{r}s f m $^{m}t_{1}$ d r d
m f s l ^{l}r d t_{1} l_{1} $^{l_{1}}$m f m } Bridge notes.

Great notice was taken of the accurate maintenance of pitch during these transitions, and simple questions on the theory of the different keys were asked.

Tune, Ear Test (*sung twice by examiner,* after giving the doh chord) :

(1) d f m d; (2) m l s m; (3) m l se l; (4) d r l_{1} d

Time, Ear Test (*sung twice by examiner*) :

(1) | 1 : 1 : 1 | 1 :- :- | 1 : 1 . 1 : 1 | 1 :- :- ‖.

(2) | 1 : 1 | 1 : 1 . 1 | 1 : 1 | 1 :- ‖.

The answers to all the ear tests were written on paper and collected.

Now all three Examiners could get to work, the upper standards commencing the ordinary subjects, whilst the music of the lower ones was finished off. The three music groups were in three different rooms. The Head Inspector took no part in the Tonic sol-fa tests, but employed his time over the log-book. In every instance particular attention was paid to the use of the different registers of the voice, the quality of the tone and the attitude of the scholars being commented upon. Scholars recently admitted were not required to sing.

STANDARD I. was minutely examined by the Chief himself, and it was pleasant to observe that both he and his colleagues throughout the morning entered into the true spirit of the 'Hart-Dyke cum Kekewich' Code, after all, inspecting more than examining, noting the intelligence, the honesty, the alacrity, and the cheerfulness more than any mere mechanical results.

Group A had Transcription from *Dr. Beach's Entertaining Reader*, p. 66.

'*Which would you rather lose, a sovereign or a pound ?*'

The correct insertion of the Comma and Note of Interrogation was duly commented upon to the great satisfaction of the mistress in charge.

Group B were given Reading from *three* books used, viz., Marshall's Universal Reader, *Dr. Beach's Entertaining Reader*, and The Pearl Reader.

Questions were asked not upon the meanings of words, but of sentences.

Group C worked the following Arithmetic :—

68	Take 84
390	From 800
672	
81	Ans. 716
707	
1918	

Three boys had one sum wrong, and these, answering their tables correctly, were passed.

Whilst the Arithmetic was in progress, Groups A and B wrote in a column all the Nouns from two verses of their Repetition.

Next, the Standard was divided into two parts, the teacher at one end of the room exercising the Mental Arithmetic, whilst the Inspector probed the Geographical knowledge. The chief points touched upon were, the plan of the school, the cardinal points, the direction of neighbouring streets, the earth as a star, the seasons, the definitions of gulf and peninsula, lake and island, strait and isthmus, taken in these pairs.

The Repetition taken was 'Two little kittens one stormy night,' and very merry and confidential were the children, one youngest informing the Head Inspector that their 'Topsey had found three kittens.'

We had a few STANDARD NONE children very recently admitted, whose attainments were carefully inquired into in relation to the time they had been with us.

STANDARD II., *Group A* (*Arithmetic*), was subdivided into Sections One and Two.

Section 1.—

7	Multiply 179 by 67,490	What is one-seventh of ten thousand?
70,070		
7,007	(Given in words)	
717	Ans., 12,080,710.	Ans., $1,428\frac{4}{7}$.
70,707		
98,765		
247,273		

Section 2.—Take five thousand two hundred and nine from fifty-two thousand and ninety.—Ans. 46,881.

Multiply ninety-five thousand eight hundred and sixty-seven by nine hundred and one.—Ans. 86,376,167.

Divide seventy-seven thousand seven hundred and seventy-seven by eleven.—Ans. $7,070\frac{7}{11}$.

(Written upon Blackboard.)

Group B (*Dictation*).—From *Dr. Beach's Entertaining Reader*, p. 92, last eight lines—

'I am sorry to say that all this kindness and self-denial told upon the poor cock's health. Just as the two chickens were well able to take care of themselves, the gentle fellow died. We children buried him with tears, and set up over his grave a slate, on which was printed, in chalk, an account of his goodness.'

This was given out, practically a word at a time, the delivery occupying nearly a quarter of an hour.

Group C (*Reading*).—From Marshall's Universal Reader; The Pearl Reader; and *Dr. Beach's Entertaining Reader*. Questions similar in character to those of Standard I. were asked, and attention was drawn to the defective provincial utterance of vowels.

It is worthy of note that one boy, *not promoted a Standard*, again failed in reading.

RECITATION.—Wordsworth's *Lucy*. 'No mate, no comrade, Lucy knew.'

The meanings of the words, of the phrases, and the scope and incidents of the selection were examined. Who was Lucy? Where did she live? What sort of weather was it? Was Lucy obedient? What became of Lucy? How did they know? etc.

GRAMMAR.—Half the Standard was examined orally, whilst the other half wrote in copy-books.

A few questions were asked as to the words, *ago*, *where*, *his*, *ham*, *go*, *were*, *is*, *am*, etc., and the words *love*, *smile*, *fight*, were required to be formed into sentences both as Nouns and Verbs. It was a "stiff" but instructive ordeal.

GEOGRAPHY.—The other half of the standard was examined, whilst the former half wrote in copy-books. We give a few of the questions verbatim :—

Mention some things explained by geographical definitions.—How is trade carried on between England and other countries? How is the coast line marked on a map? What names would you see round a coast line? What are things dug out deep from the earth called? Why are coast lines not straight? What kind of a shore does the sea wash away? What kind of fruits grow in hot countries? What do dotted lines on a map mean? What are trading towns on the coast called? What water is there near Northfield? and a hundred others.

MENTAL ARITHMETIC was taken by Teacher and *as in all the standards* was ordered to be so managed as to show (1) its Practical utility, and (2) The preparation for the next higher standard.

TEACHING.—The Pupil-Teacher (4th year) gave a first lesson on Long Division.

STANDARD III.—*Group A.* (*Arithmetic*).

Card I.

£	s.	d.
195	6	$3\frac{1}{2}$
4	19	$11\frac{1}{4}$
200	3	2
567	18	$4\frac{3}{4}$
404	12	$3\frac{1}{2}$
6	0	$0\frac{1}{4}$
£1379	0	$1\frac{3}{4}$

(1) Take three hundred and fifty-four pounds and sixpence three-farthings, from £1,000.—Ans. £645 19s. $5\frac{1}{4}$d.

(2) Share three millions fifty thousand four hundred and seventy-one nuts equally among 199 boys.—Ans. 15,329.

(3) Prove the last sum by dividing the Dividend by the answer, and getting the Diviser for the new answer.—Ans. 199.

The boys were required to show how they would turn farthings to pence, pence to shillings, and shillings to pounds, when the numbers were too large for the tables to apply.

Card II.

(1) Divide six hundred and forty thousand and fifty-four by eighty-nine.—Ans. 7,191+55.

(2) Add together £7,936 18s. $4\frac{1}{2}$d. ; £12,397 16s. $10\frac{1}{2}$d. ; £85 9s. $11\frac{1}{2}$d. ; £76,943 15s. 8d. ; £7,289 14s. $6\frac{1}{4}$d. ; £63 12s. $7\frac{1}{2}$d.—Ans. £104,717 8s. $0\frac{1}{2}$d.

(3) Take sixty-eight pounds fourteen shillings and tenpence halfpenny, from six thousand and three pounds and fivepence farthing.—Ans. £5,934 5s. $6\frac{3}{4}$d.

(4) There are 360 scholars in a school, 250 are infants, half the rest are girls, and the remainder boys. How many boys are there in the school?—Ans. 55.

Card III.

(1) Divide eleven millions, three hundred and three thousand and seventy, by five-hundred and sixty-three.—Ans. 20,076 + 282.

(2) £5,230 9s. 8d. + £6,953 5s. $4\frac{1}{2}$d. + £17 16s. 5d. + £716 17s. $9\frac{1}{4}$d. ; £2,689 4s. $1\frac{3}{4}$d. + £206 6s. 4d. + £6,708 0s. $5\frac{1}{2}$d.—Ans. £22,522 0s. 2d.

(3) Take £17 0s. 8d. from 21 guineas.—Ans. £5 0s. 4d.

(4) I sell 7 tons of potatoes for £21 17s. 6d. I gave £21 3s. 6d. for them. What did I gain per ton?—Ans. 2s. 0d.

Card IV.

(1) Subtract the thirteenth part of 9,438 from 26 times 382.—Ans. 9,206.

(2) A man left home with £10 in his pocket; he paid away 4 sovereigns, 3 half-sovereigns, 2 crowns, 5 sixpences, and 87 pennies. How much did he bring back?—Ans. £3 10s. 3d.

(3) What must be added to 13s. 0d. to make £14 10s. 0d.?—Ans. £13 17s. 0d.

(4) A girl hems one inch in 2 minutes. How long would she be in hemming a square fifteen inches each way?—Ans. 120 minutes or 2 hours.

Group B (*Dictation*).—The following passage from 'Blackie's Century Reader,' p. 87, was dictated once only, as follows; about twelve minutes being consumed :—

'He used, too, to be fond of pulling the sofa cushions on the floor and biting the tassels off. Indeed, he was more mischievous than the worst puppy I ever saw. He was very sly, too, and Snap and I often got blamed for what the monkey had done, as he took good care he was not often seen at his tricks. He mixed the salt and oatmeal together.'

The word *mischievous* was allowed to be spelt by the Teacher, who was directed to give out the Dictation.

Group C (*Reading*).—From 'Blackie's Century Reader,' *Dr. Beach's Entertaining Reader*, 'Gill's Stories from English History,' and 'Moffatt's Geography Reader.'

A good number of the questions asked were more grammatical than literary. Take as an instance this sentence, '*When John's father found that talking was of no use, he severely punished him.*' What did John's father do? Whose father? What was found out? How was John punished? What word stands for John? What part of speech is *talking*?

GRAMMAR was taken *viva voce* throughout half the class, whilst the remainder wrote in copy-books. This passage was well pulled to pieces, *every* word being parsed as fully as the scholars could :—

'Thus they treated Caractacus and his family. Calm and unsubdued in spirit, the captive chief marched on, admiring the handsome city of Rome, and overcome with wonder that those who lived in such fine palaces should envy him his humble cottage in Britain.'

Such words as *unsubdued, admiring, overcome* were allowed to be called either Verbs or Adjectives. The Scholars who knew them to be Participles evidently got extra credit.

Sentences were next required to be formed in which the Adverb modified Verb, Adjective, and another Adverb. The definitions of the parts of speech were repeated.

GEOGRAPHY was taken by the remaining half of the scholars, whilst the former moiety had their exercise books brought out and distributed, and were ordered to write out eight lines of their recitation. Below are a few of the questions :—

What town stands on the Don? What takes place there? What does Caster mean? Name a large town in Yorkshire which manufactures woollen goods? Where else are these manufactured? What seaside places are there on the Coast of Yorkshire? What rivers form the Humber? Which of them receives the most tributaries? Why? What county is south, north, west, east of Yorkshire? What is Kingston generally called? Where is the Wirral Peninsula? Into what counties does London extend? If a ship sailed from Boston to Gloucester, what would its cargo probably be?

These questions over, a blank map of England was produced, and the scholars had to point out the chief lines of railway, with about five of the principal stations on each.

RECITATION.—We took 'The Fairies of Cauldon Low.' This was heard a verse at a time, from individuals and rows of children, and from the whole class.

Scarcely any question for some reason or other was asked upon it.

MENTAL ARITHMETIC.—The Assistant Master, and afterwards the Assistant Inspector, gave various exercises. Those by the latter were such as these :—

How often does Leap Year come in twenty years? How many more inches than feet are there in a yard? If half a pound of tea cost 1s. 6d., what will a stone cost? How many stones are there in a cwt.? Add together 15 times 50 and 5 times 50? How much greater is a fourth of a sovereign than a fifth? I went to market with a guinea, bought certain articles, how much change?

STANDARD IV.—*Group A* (*Dictation*).—From p. 189, Nelson's 'Swiss Family Robinson,' a book not used in the school. 'As for ourselves,' I said, 'we must not expect too much; the albatross is a bird which travels great distances, and it may happen that the poor wretch who wrote the message is so far away from our island that any attempt to discover him will be fruitless. But let us keep the secret between us, and I will think over the best means of saving the poor fellow if he be alive, without causing any anxiety to your mothers and brothers.'

Before the *teacher* gave it out, the Inspector kindly remarked to the scholars that the word *albatross* was not strange to them, being found in a book they did use, viz., 'Masterman Ready.'

About ten minutes was allowed.

Group B.—Reading from an unseen book, 'Swiss Family Robinson,' 'Masterman Ready,' 'Gill's Standard IV. Historical Reader,' 'Gill's Standard IV. Geographical Reader,' 'Pearson's Weekly,' and 'Tit-Bits.' Only the best boys selected by the Master took the unseen reader, and we did not hear a single question asked respecting the matter or meaning of the passages. The best boys only read a few words, and as fast as each boy was heard he was set to do his Grammar on paper from the blackboard.

Group B.—Grammar.—The following questions were set to alternate boys.

(*a*) (1) Parse (and analyse if you can) the following :—
'Whistling a tune, the boy quickly took his way through the churchyard.'

(2) Make three sentences containing the word *that* employed in different ways.

N.B.—On our representation the words *employed in different ways* were omitted for the words *used as different parts of speech.*

(*b*) (1) Parse (and analyse if you can) the following :—
William was a boy ever earnest and cheerful in his manner.

(2) Make three sentences containing a Verb in the Active Voice, a Verb in the Passive Voice, and the word *but* used as a Conjunction.

Group C.—Arithmetic.—(Forty-five minutes were allowed.)

Card I.

(1) What would 15 cwt. cost at 3½d. per lb?—Ans. £24 10s. 0d.

(2) Multiply £376 9s. 6½d. by 59.—Ans. £22,212 4s. 2½d.

(3) Divide £3,219 15s. 2½d. by 175.—Ans. £18 7s. 11½d.+110.

(4) How many chains in 5,417 poles?—Ans. 1,354¼.

Card II.

(1) Divide £56,012 11s. 0½d. by 386.—Ans. £145 2s. 2½d.+319.

(2) Find how many half-ounces there are in half a cwt.—Ans. 1,792.

(3) How many half-crowns are there in 4,873 pennies?—Ans. 162⅓.

(4) A milkman sold 17½ gallons of milk a day at 2½d. per quart. How much money would he receive during the month of May?—Ans. £22 12s. 1d.

Card III.

(1) £96 12s. 9½d. × 382.—Ans. £36,915 18s. 5½d.

(2) £241,006 17s. 4½d. ÷ 268.—Ans. £899 5s. 7d.+50.

(3) Bring 50,050 halfpence to £ s. d.—Ans. £104 5s. 5d.

(4) I divide a sum of money among 32 boys and 48 girls. Each boy gets 12s. and each girl three times as much. How much did I give away?—Ans. £105 12s. 0d.

Card IV.

(1) A boy has three halfpence given him every day. How much does he get in a year?—Ans. £2 5s. 7½d.

(2) Multiply £87 9s. 11½d. by 83.—Ans. £7,262 8s. 3½d.

(3) Bring 70,007 inches to miles.—Ans. 1 mile, 8 chains, 1 pole, 2½ yards, 1 foot, 11 inches.

(4) What amount multiplied by 47 will reach £8,943 15s. 1½d.?—Ans. £190 5s. 10½d.

GEOGRAPHY.—In this subject half the class was examined, but no questions were asked about any country except Ireland. Some of the queries were :—

Of what race are the Irish? What religion? What religion in Ulster? Where are the chief manufactures carried on? What was Londonderry noted for? What town in the S.W. is similarly noted? What river is Limerick on? What lakes does the Shannon expand into? Where is the largest bog situated? How does the arrangement of mountains differ from that of England? What continent resembles Ireland in this respect? Where does more rain fall, in Ireland or England? Why? Where does the Atlantic cable end? What town do Atlantic liners call at in the South? In the North? In going to New York how would the steamer round Ireland? In going to Quebec?

The inspector took up about ten minutes in describing his visits to Killarney and Giant's Causeway, meanwhile the remaining half of the standard wrote by alternate boys in their exercise books and copy-books.

RECITATION.—Half the standard were engaged in this, whilst the other half did Mental Arithmetic. The pieces selected were '*Boadicea*' and '*Tubal Cain*,' but the first only was examined, and this at great length by the Head Inspector. He asked :—

Who was Boadicea? Did the scholars know what a *lictor* was? What was scourging? Who else had been scourged? Who else was maltreated at the same time? What religion was she? What tribe was she of? What do the words *mien, sage, hoary, resentment, abhorred, harmony, progeny*, &c., mean? Who were the Goths? What do the phrases '*burning word*,' '*to kiss the ground*,' '*progeny of our forests*,' '*armed with thunder*,' '*clad with wings*,' '*regions Cæsar never knew*,' &c., mean? What can we find at Stonehenge?

MENTAL ARITHMETIC.—Given by Assistant, who dwelt chiefly upon aliquot parts, and elementary proportion sums dissected by Method of Unity.

Finally, 'the Recitation half' worked three 'LONG TOTS' of the usual character, on slips of paper. Twelve minutes were allowed, and *every* mistake was marked in the room.

Meanwhile 'the Mental Arithmetic half' was taken orally in 'LONG TOTS' from the blackboard. The points trained out were (1) consecutive small values being combined at once (*e.g.* 9 + 4 + 2 being treated as 9 + 6); (2) consecutive figures whose sum was (say) 11 or 12 being combined at once (*e.g.* 9 + 6 + 5 being treated as 9 + 11); (3) neighbouring figures whose sum equalled 10 being taken together (*e.g.* 5 + 4 + 5 + 3 + 6 + 7 being treated as 5 + 5 +4 + 6 + 3 + 7, or as 10+10+10).

To these scholars also were propounded a few questions on the notation of decimals as preparatory to the Metric System. ·5946 was written down. What was 5? What fraction did the 9 represent? The 4? The 6? What would be the denominator of the 59 taken together? How many thousandths did the 5 represent? How many the 9?

The children failed to say how many tenths the 9 equalled, but this question was evidently tentative only.

STANDARD V.—*Group A* (*Reading*).—The boys read from an article in an ancient '*Standard*,' and the questions asked were chiefly about kindred words to those occurring in the passage. As each boy read he commenced his Grammar, which was taken on paper. The Reading occupied only about ten minutes.

Group A.—Grammar from blackboard.

(*a*) (1) 'Come not near yon terrible animal aroused to great fury.' Parse and Analyse the foregoing :—

(2) Make Nouns from *smite, hold, dig;* Verbs from *spark, light, trench;* and Adjectives from *brass, wrath, plenty.*

(*b*) (1) 'We shall never see his like in England again.' Parse and Analyse the foregoing :—

(2) Make Nouns from *speak, lose, think;* Verbs from *bank, bath, clean;* and Adjectives from *fool, reck, wretch.*

Group B (*Composition*).—The following story was twice read by the Inspector.

'A Jewish merchant once journeyed to Rome taking with him an intelligent slave and all his valuables, and leaving at Jerusalem his only son. But shortly after reaching his destination he died.

'When the news reached the son, his sorrow was extreme, and it was not decreased by the fact that the deceased had left all his property to the slave with the exception of any one article that he was at liberty to select.

'The unfortunate young man went to the Chief Rabbi, and complained of his father's conduct. "Rather respect him the more," replied the Rabbi. "He was fearful that in a strange land the slave would prove unfaithful and waste your wealth, unless he caused him to preserve it for himself. But do you now proceed to Rome and choose the slave as the one article left to you, and then all the property will return to you."

'The son acted as was advised, recovered all his goods, and shortly after set the slave at liberty.'

The word *Rabbi* was spelled for the scholars.

Group C (*Arithmetic*)—

Card I.

(1) Find the cost of 81 acres 3 roods 10 poles at £7 4s. per acre.—Ans. £589 1s.

(2) $\frac{7}{16} + \frac{1}{4} - \frac{3}{8}$.—Ans. $\frac{1}{16}$.

(3) How far can I send a parcel weighing 100 lbs. for 2s. 6d. at the rate of 3s. 4d. for 100 miles?—Ans. 75 miles.

(4) 16 yards at 4s. 9d. per yard; 7½ yards at 2s. 10d. per yard; 24 yards at 4¼d. per yard; 6 dozen yards at 2¼d. per yard; 500 yards at 2 for 1½d.—Ans. £7 11s. 6d.

Card II.

(1) What will 168 articles cost at £1 8s. 3d. each.—Ans. £237 6s.

(2) Find the difference between $\frac{3}{8} + \frac{1}{16}$, and $\frac{3}{4} - \frac{1}{8}$.—Ans. $\frac{1}{16}$.

(3) A farmer paid £63 as rent for 40 acres. What should he pay as rent for 2 acres 4 roods?—Ans. £4 14s. 6d.

(4) Make out and receipt a bill for 9½ lbs. of raisins at 5d. per lb.; 1¼ cwt. of sugar at 2¾d. per lb.; 2½ dozen boxes at 3s. 6d. a gross; 16¼ lbs. at 10d. per lb.—Ans. £2 7s. 4½d.

Card III.

(1) If 400 cows cost £3,260, what will 420 cost?—Ans. £3,423.

(2) Make out a bill for 18 lbs. of currant cake at 6½d. per lb.; 42 buns at 7 for 1s.; 15 lbs. seed cake at 5½d. per lb.; 45 cheese cakes at 10d. per dozen; 8½ loaves at 4½d. per loaf.—Ans. £1 8s. 11¼d.

(3) $\frac{3}{5} + \frac{4}{5} - \frac{1}{5} + \frac{4}{5}$.—Ans. $1\frac{9}{15}$.

(4) Find the value of 64 acres 3 roods 20 poles at three guineas per acre.—Ans. £204 7s. 1½d.

Card IV.

(1) A man exchanged a cwt. of sugar for 40 lbs. of tea at 7d. per lb. What was the sugar per lb.?—Ans. 2¼d.

(2) If the railway fare for a journey of 312 miles be £1 19s., how many furlongs can I go for 18s. 6d?—Ans. 1,184.

(3) $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} - \frac{1}{2}$.—Ans. $\frac{3}{16}$.

(4) Make out an invoice for 36½ lbs. of beef at 9½d. per lb.; 47¾ yards of lace at 6½d. per yard; 14 gross of tops at 5¾d. per doz.; 16½ lbs. of soda at 9¾d. per doz. lbs.; 143 trowels at half-a-crown each.—Ans. £24 13s. 10½d.

The Teacher was asked to give a first lesson on Simple Proportion.

GEOGRAPHY.—In this subject half the pupils were questioned somewhat as is appended—

How long is the Volga? How wide is Europe? Mention the European races? Name the religions of Europe? What are the volcanic regions of Europe? Where are the three chief groups of lakes? Where is Novgorod, Versailles, The Hague, Oban, Tunstall, Palermo, etc.? Whence do we obtain wine, oranges, figs, raisins? Which are the Republics of Europe? The limited monarchies? The dual kingdoms? The despotisms? Enumerate the Balkan States? Where are the steppes, the geysers, the fiords? What is the longitude of Greenwich? What is the difference of time between 15° E. longitude and 15° W. longitude? What is the longitude of a place where it is 3 p.m. at our noon? What is the latitude of the N. Pole? What is the circle of illumination? What are the Equinoxes? The Solstices? What do we mean by the parallelism of the earth's axis? The earth is nearer the sun in our winter than in summer, explain this. What are the Antipodes?

Maps of France, the Rhine, and the Baltic Sea were drawn, each by about one-sixth of the class.

METRIC SYSTEM.—The half left from Geography was rather perfunctorily examined. The Greek and Latin terms employed were requested, and a few questions asked about the decimal system suggested for our coinage. Then this section proceeded to—

MENTAL ARITHMETIC, which, as in *all* the other standards, bore chiefly upon next year's work. Exceedingly easy questions in Interest were propounded. What is meant by so much per cent.? How much will £100 gain in six months at 5 per cent.? How much will £50 gain in a year at 4 per cent.? The 1st, 3rd and 4th terms of a proportion sum are 5, 4 and 9, what is the 2nd term? How many twelfths are there in two-thirds? How many more twenty-eighths are there in ¼ than in ⅛?

RECITATION.—The same moiety which took Geography was examined in Recitation also. The poetry chosen was selected from *The Pied Piper of Hamelin.* This was not heard consecutively through, but the children were dodged backwards and forwards therein. Then the various rhymes were asked for, and their ingenuity commented upon. Why was the piper said to be *pied*? Where is Hamelin? Which was the dampest side of the city? What kind of country lay on the other side of the Weser? Who was the Nizam? What is nuncheon? What are sharps and flats? What colour is tawny? What creature has a tawny mane? Had the boys ever read 'Bishop Hatto and the Rats?' How much is a guilder? A thousand guilders?

LONG TOTS were as in Standard IV., the same time being allowed.

STANDARD VI., *Group A.—Reading* as in Standard V., and then LONG TOTS as in former standards.

Group B (*Composition*).—Every boy had to write a letter to his father upon some such subject as the following: A game at cricket; A walk in the country; Dogs; Accidents; Paper. Some were asked what they could write about, and were allowed the subject they mentioned.

Group C (*Arithmetic*)—

Card I.

(1) What is the rate per cent. on £1,000 for two years if the interest is £37½?—Ans. 1¼ per cent.

(2) Simplify $\frac{\frac{1}{2} - \frac{2}{5}}{\cdot225 + \cdot25 + \frac{3}{20}}$.—Ans. $\frac{1}{11}$.

(3) £100 is to be divided between three persons; the second is to have twice as much as the first, and the third three times as much. How much will each have?—Ans. £16 13s. 4d.; £33 6s. 8d.; £50.

(4) Find the simple interest on £945 for 6 years at 3¾ per cent.—Ans. £212 12s. 6d.

Card II.

(1) How many times is ⅜ of 30 poles contained in ⅘ of 11¼ acres?—Ans. 50 times.

(2) What is the answer in decimals when ⅜ × ⅘ is lessened by ·07 of ·075?—Ans. 1·49475.

(3) What does £6,055 6s. 8d. amount to in 2½ years at 3½ per cent. simple interest?—Ans. £6,585 3s. 6d.

(4) Simplify $\frac{1\frac{1}{2} \text{ of } \frac{7}{10} - \frac{3}{5}}{\frac{9}{13} \times \frac{4}{7} + \frac{8}{5}}$.—Ans. $\frac{14}{1337}$.

Card III.

(1) A man spent £50 in buying oranges at 11s. 3d. per gross. How much did he gain by selling them at 1½d. each? Ans. £30.

(2) Multiply ·075 by ·363.—Ans. ·027.

(3) Reduce to the fraction of £1, ⅘ of £1 + $\frac{9}{10}$ of a crown + $\frac{1}{10}$ of ⅘ of $\frac{1}{10}$ of £1, minus $\frac{9}{10}$s.—Ans. $\frac{33}{40}$.

(4) What is the amount at Simple Interest of £396 5s. for 5 years 4 months at 4 per cent. per annum?—Ans. £480 15s. 8d.

Card IV.

(1) A man puts £750 into the bank at 3½ per cent. simple interest. What amount would he have at the end of 3¼ years?—Ans. £835 6s. 3d.

(2) A man steps 2½ feet, and a boy 1¾ feet. In a certain distance a man takes 250 steps. How many would the boy take?—Ans. 350.

(3) Reduce £17 10s. 1d. to the decimal of £1 15s. Ans. 10·00238.

(4) Simplify $\frac{1\frac{1}{2} \text{ of } 1\frac{1}{2} \text{ of } 3\frac{1}{2}}{1\frac{1}{2} + 1\frac{1}{2} + 3\frac{1}{2}} \div 25$.—Ans. $4\frac{4}{175}$.

GRAMMAR was tested *viva voce* in conjunction with Standard VII., half of each Standard being selected, as were also Geography, Recitation, and the Metric System. The principal points touched upon were the uses of Participles, words such as Relative Pronouns and Adverbs with double functions, the Noun Sentence both as Subject and Predicate, the Noun Sentence introduced by *it*, the Adverbial Sentence not always in the Extension of Predicate, the Adjective Sentence introduced by *where*.

This was the only part of the proceedings that appeared to border upon injustice, but we were distinctly assured that everything was progressing satisfactorily, and that every allowance was being made for defective answering of too advanced questions.

The Latin roots *fero*, *duco*, *cedo*, *curo*, *cresco*, and *dico* were written on the blackboard, and the Assistant Master, the teacher of Standards VI. and VII., was invited to procure from the class such LATIN PREFIXES, as combined with the roots would form ordinary English words.

GEOGRAPHY of the United States, tides and ocean currents, was the work of the other half of the two highest standards.

The examiner took the scholars an imaginary journey across the States from the Pacific to the Atlantic, and questioned upon the surface traversed, the local occupations and productions. He asked for the positions and names of the States forming such groupings as 'the *Cotton* States,' 'the *Gulf* States,' '*Lake* States,' '*Slave* States,' and 'the *Original* States.' The History of the settlement and expansion of the country, its constitution and commercial policy were well tested. Said he, 'How many States? How many Territories? What is the difference between a State and a Territory? Which is the older? Where do the Mormons live? Where are the Negroes found? Whither do most Chinamen come? Where is the Indian Reserve? Account for the great difference in climate in the various parts? What are the productions of various States? What currents affect the E. coast? How are they caused? What are tides? With what bodies are they connected? Explain the combined and opposed influences of the Sun and Moon? What are Neap Tides? Spring Tides? Average height of tide in Mid-Pacific, Mediterranean, Bristol Channel, Bay of Fundy? How often does High Tide occur? The tides around the North of the Isle of Wight?

The MAPS drawn were Western Portion of Gulf Stream, Mississippi, and the Eastern States.

RECITATION.—The poetry offered was 'The Quarrel Scene between Brutus and Cassius.' Half of the two standards were selected, whilst the other half wrote in Copy and Exercise Books. Different scholars were in turn denominated Brutus and Cassius, and were allowed to declaim at each other. In addition to those appended, some elementary questions about the events and persons dramatised were asked—

Who were Brutus and Cassius? What brought them under arms? What place were they at? Who were opposing them? Who were the Sardians? What is the subject to the verb *doth appear?* Explain such terms as *noted*, *nice*, *comment*, *itching palm*, *Ides of March*, *choler*, *vaunting*, *rote*, *Plutus' mine?* Mention some Roman deities? How much was a drachma? What name did '*Young Octavius*' afterwards assume? Explain the form Justice', &c.

One young Hopeful, probably on purpose, caused great merriment by perverting the line—

'*Did not great Julius bleed for Justice' sake?*' into—
'*Did not great Justice bleed for Julia's sake?*'

THE METRIC SYSTEM was taken exactly on the same lines as in Standard V., except that more questions were asked about the measures of two and three dimensions, and a greater knowledge of their decimal character was assumed, *e.g.*, 29 decasteres, 7 steres, and 5 decisteres were required to be expressed in as many ways as possible.

STANDARD VII.—*Group A.—Reading* as in Standard V., and then LONG TOTS as in former standards.

Group B.—Composition upon abstract subjects such as *Punctuality*, *Courage*, *Obedience*, *A good character*, and *Kindness to Animals*.

Group C. (*Arithmetic*)—

Card I.

(1) Find the weight of 2 miles 3 furlongs 110 yards of telegraph wire, each mile of which weighs 8 cwt. 3 qrs.—Ans. 21 cwt. 1qr. 8 lbs. 12 oz.

(2) Simplify $(\frac{7}{16} - \frac{1}{4}) \times (\frac{1}{2} + \frac{1}{3}) \div \frac{9}{64}$.—Ans. 2⅓.

(3) A man wishes to spend 5s. 9d. a day for 75 days. At the end of 45 days he has spent £11 12s. 6d. What must be his average daily expenditure for the rest of the time?—Ans. 6s. 7½d.

(4) In a school there are 250 children; 36 per cent. are in the first standard, 26 per cent. in the second, 18 per cent. in the third, and the remainder in the fourth. How many are there in each standard?—Ans. 90, 65, 45, 50.

Card II.

(1) A man lost 25 per cent. by selling his stock of tea at 1s. 3d. per lb, At what price per lb. did he buy it at?—Ans. 1s. 8d.

(2) Twelve suits of clothes took on an average 4¼ yards of cloth. Of these 7 suits consumed 3¾ yards each, and 4 suits took 4⅞ yards each. How much was left for the last suit?—Ans. 5½ yards.

(3) Find the cost of 7 cwt. 2 qrs. 17½ lbs. at £3 15s. 4½d. per qr.—Ans. £115 8s. $4\frac{5}{16}$d.

(4) I gave away ⅓, then ⅓ of the remainder, then ·125 of the whole. I had £375 left. How much had I at first?—Ans. £3,000.

Card III.

(1) How much shall I have to pay for £5,495 stock in the Four per Cents. at 94⅜?—Ans. £5,187 5s. 7½d.

(2) Multiply 3 cwt. 1 qr. 14 lbs. by 53⅛.—Ans. 9 tons 1 cwt. 2¾ qrs.

(3) Take the fourth part of ·037 from the product of 2·307 and 60·3.—Ans. 139·10285.

(4) If 8 men earn £9 for 5 days' work, how much would 32 men earn in 24 days at the same rate?—Ans. £172 16s. 0d.

There does not appear to have been any Mental Arithmetic in Standards VI. and VII.; and the Grammar, Geography, and Recitation have already been dealt with under Standard VI.

Thus ended the *First Day's Examination*, and the writer's admiration of the sample system introduced by the present code is confirmed by this his second experience of it.

The inspectors were cheerful and obliging; in fact, on some occasions, rather too pleasant, for some lazy scholars scarcely exerted themselves enough, thinking that they were having a pleasant time. There was no interference with freedom of classification. Some of the papers were marked in the school. There was no attempt at concealing results, and I noted the following points:—

(1) Four SUMS right secured '*E*,' three right '*G*,' two right

'*F*.' Two sums nearly right were allowed to count as a little more than one completely right, and neatness was duly recognised with a plus (+) mark.

(2) In the DICTATION several hard or unusual words spelt wrong seemed to be passed over, the paper appeared to be assessed as a whole, and neatness, accuracy, and style to influence the award.

(3) The READING was of a high character; and distinct enunciation, intelligent phrasing, and, in the upper standards, elocution were elements in the calculation.

(4) The GRAMMAR was viewed first as the art of *using* English; *second*, as an exercise in reasoning. Mistakes in the syntax lost heavily.

(5) The GEOGRAPHY was peculiarly noticeable from the absence of numerical questions. Climate, productions, commerce, race, and religion were prominent.

(6) To RECITATION the same remarks apply as to Reading, only in a higher degree. Mere parrot memory work was at a discount.

The whole process was completed by noon, and a half-holiday was given after a heavy morning's work, more on the part of H.M. officials than on that of the scholars and teachers.

SECOND DAY.

On this occasion the scholars met at the ordinary time, nine o'clock, and the three inspectors did not appear until 9.30. They apportioned their duties as follow :—

The SENIOR INSPECTOR viewed the school as far as possible at its every-day work, heard the lesson of a parchment-desiring assistant, listened to the pupil teachers' recitation, inspected their note-books used during the year, showed them their last examination answers, and made inquiry as to their progress in such extras as more advanced Mathematics, Drawing, Science, and Language. In addition he examined the sanitary arrangements, suggested to the Managers improvements in the premises, looked into the library and compared its condition with the assertions of '*Form IX.*,' and inspected the drawing report and penny bank accounts.

Much of his conversation was devoted to urging instruction in HANDICRAFT.

The JUNIOR ASSISTANT, in the meantime, audited the school accounts, inspected the drill up to and including Standard IV., and strictly probed into the registration, etc.

It was found and noted that a candidate for apprenticeship, two ex-Standard VII. scholars, and three boys over fourteen years old were on the registers.

These were at first objected to, but the Inspector was soon satisfied with regard to them, and he probably learnt something himself about those provisions of the code which relate to the last-named.

It was noted that the New Attendance Registers were already signed by the Correspondent according to the recent regulations.

The items most particularly scrutinised in the LOG BOOK were the dates upon which the Registers had been called and checked by Managers, as certified on '*Form IX.*,' the due mention of holidays, and the entry of last year's report, and present year's staff subscribed to by the Correspondent, the lists of authorised poetical extracts for the ensuing year's Recitation, the periodical apportionment of work, and the result of Test examinations.

A few casual remarks showed his sympathetic interest in the school Cricket Matches, Excursions, Magic-Lanterns, and Concerts.

The remainder of the morning was spent in helping the Senior Assistant with the Specifics.

THE SENIOR ASSISTANT AND THE SPECIFICS.—

These '*extras*' were subjects I. and VI. of '*Schedule Four*,' viz., Algebra and French, and all three *stages* of each were taken. Appended are the questions which were given out in Algebra by the Senior Assistant immediately after his entrance.

ALGEBRA.

Stage I.

(1) Simply the following :—

(*a*) $4x - \{2x - (x+2)\}$ and find its value when $x = -\frac{1}{4}$. —Ans. $-\frac{1}{4}$.

(*b*) Factorise $x^4 - y^4$.—Ans. $(x^2+y^2)(x+y)(x-y)$.

(2*a*) Add together $7ab - 3mn + 4xy$; $-6ab + 7mn + 3yx$; $-2ba + 2xy$; $-7nm + ab$.—Ans. $-3mn + 9xy$.

(2*b*) From the sum of (2*a*) subtract $ab + 9xy$.—Ans. $-ab - 3mn$.

(3) Multiply $a^3b^3 - a^2b + ab^2$ by $a^2b^2 + a^2b + ab^2$.—Ans. $a^4b^4 + 2a^3b^4 - a^4b^2 + a^2b^4$.

(4) Find the continued product of $(a+b)(a-b)(a^2+ab+b^2)(a^2-ab+b^2)$.—Ans. $a^6 - b^6$.

Stage II.

(1) Find the G.C.M. (or H.C.F.) of $8a^3 + 1$ and $16a^4 + 4a^2 + 1$. —Ans. $4a^2 - 2a + 1$.

(2) Find the L.C.M. (or L.C.P.) of $xy^2 - y^3$, $x^2y^2 + xy^3$, and $x^2y - y$.—Ans. $xy^2(x^2-1)$.

(3) $\frac{x-2}{5} - \frac{x-3}{4} = \frac{x-7}{10}$ Ans. $x = 7$.

(4) A father is six times as old as his son, and in four years he will be four times as old. How old is each?—Ans. Father 36, Son 6 years.

Stage III.

(1) Factorise $12x^2 - 7xy - 10y^2$, and also $x^3 - 3x^2 - 18x$.— Ans. $(3x+2y)(4x-5y)$; $x(x+3)(x-6)$.

(2) Express in its simplest form—

$$\frac{x^2+2x}{x^2-9} \times \frac{x^2-3x}{x^2-4} \quad \text{Ans.} \quad \frac{x^2}{(x+3)(x-2)}.$$

(3) Divide £30 among 10 men, 20 women, and 40 children, giving to each man 15s. more than to each child, and to each woman as much as two children.—Ans. £1 per man, 10s. per woman, 5s. per child.

(4) $x + \frac{1}{x} = \frac{13}{6}$ Ans. $x = \frac{2}{3}$ or $\frac{3}{2}$.

Out of fifty-five presented in Algebra six failed, and none of these were in the eight who took the Third Stage.

FRENCH.

Whilst the Algebra was in train, the Junior Assistant had finished his checking, and the two assistants then went around and heard all the boys read in French, and then translate into English. After the Algebra was completely over, the French Grammar, &c., was gone into *viva voce*, there was no paper work.

Stage I.

(1) Each scholar read and translated into English about five lines from M. H. Bué's First French Book, pp. 126 to 137

(2) Next, every boy had to answer a few of such questions as these :—How do you translate '*On rapporta*'? What number is it in French? What number is your translation? What parts of speech may '*que*' be? What person, number, and tense is '*tenait*'? '*Au fond*'? What is the gender of *fond*? How do you know? '*On lui demanda ce qu'il avait.*' What is the idiomatic meaning of this? '*J'en aurais quatre.*' Translate '*en.*'

(3) Put into French '*Whilst passing*,' '*What is your name?*' '*The black man*,' '*The steam engine*,' '*Steam boats*,' '*So much the better*,' '*Afresh*,' '*Fellow travellers*,' '*Both*,' '*Dry bread.*' '*A glow-worm*,' '*At an inn*,' '*Not at all*,' '*I was up*,' '*It is true*,' '*On foot*,' '*At five o'clock*,' '*Some chocolate.*' All the above phrases are to be found in the prescribed ten pages, and a few were asked of each lad.

(4) What is the Imperative of *Avoir*? *Etre*? The Present Subjunctive singular of *Donner*? *Finir*? *Recevoir*? The Present Subjunctive plural of *Aimer*? *Punir*? *Conçevoir*? The Imperfect Indicative singular of *Avoir*? *Etre*? *Abreuver*? *Dormir*? *Aperçevoir*? *Rompre*?

Stage II.

(1) Each scholar read and translated about eight lines from M. H. Bué's Second French Book, pp. 151 to 163.

(2) Next, a few questions of the appended kind were propounded to each pupil. Translate '*My dear fellow*,' '*I am very sorry*,' '*You missed the train.*' What is the difference between '*marche*' and '*marchepied*?' Put into French '*Luckily for you*,' '*Not at all*,' '*Poor fellow*,' '*Excuse me.*' What is the difference between *porte* and *portière*? Explain '*Voila le quart d'heure de Rabelais.*'

(3) What are the days of the week in French? Count in French up to ten. From ten to twenty. From twenty to thirty. How are Feminines formed from Masculines? How are Plurals formed from Singular Nouns? Put into French '*We have not*,' '*You have not given*,' '*They may not*

have punished,' '*Has he received?*' '*Will she love?*' '*Can I speak?*' '*Can I not speak?*' How are the Comparative and Superlative Degrees formed? Put into French '*My father*,' '*My fathers*,' '*Our father*,' '*Our fathers*,' &c.

(4) Present Indicative of *Aller*, Imperfect Subjunctive of *Boire*, Imperfect Indicative of *Connaître*. Past Definite Indicative of *Craindre*, Imperative of *Dire*, Present Indicative of *Dormir*, Imperfect Indicative of *Écrire*, Past Definite Indicative of *Faire*, Present Subjunctive of *Joindre*, Imperfect Subjunctive of *Lire*, Past Definite Indicative of *Mettre*, Present Indicative of *Mourir*, Imperative of *Naître*, Future Indicative of *Ouvrir*.

Stage III.

(1) Each candidate read in French and then translated into English about ten lines from M. H. Bué's New Conversational First French Reader, pp. 1 to 52.

(2) Put into French, '*He upset the table with all upon it*,' '*She doesn't know how to do it*,' '*I am very well I thank you*,' '*Will you oblige me by calling on me?*' '*How much must I give the coachman?*' '*What o'clock is it?*' '*How old are you?*' '*I am hungry.*' Explain: '*Revenir à ses moutons*,' '*Je ferai mon chemin*,' '*Comme on fait son lit, on se couche*,' '*Il faut le voir*,' '*Le jeu ne vaut pas la chandelle.*'

(3) Give the Imperfect of '*Il y a.*' Explain '*Son amie.*' With what auxiliary are the compound tenses of reflexive verbs conjugated? Give the plural of *Général*. Give two plurals of *Aïeul*, and explain their different meanings. Put in the feminine *breton*, *paysan*, *nouvel*. Parse *que* in *coûte que coûte*. What is the general rule for the formation of the plurals of compound words, such as *chef-d'œuvre*? Most, if not all, of these questions were taken from Bué.

(4) Exactly as in Stage II.

After the examination the inspectors were supplied with home-made Duplicate Schedules on which to record for us the results of the Specifics. Forty-nine were presented in French and five were '*plucked.*'

It remains now only to be said that these two days, whose experiences have been so minutely recounted, were days rather of pleasure than toil. The sheen of the forthcoming GRANT cast its radiance before, and the teachers all felt like the fortunate farmer when he sees his last sheaf safe in his barn.

Further we obtained from the Inspectors and Manager's present Four Pounds for the Teachers' Funds.

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PUPIL TEACHERS' COURSE.

THE October examination is now a thing of the past, and the pupil teachers just examined should get to work at once. Those whose time of trial was in April last, should by now have gone through all their course thoroughly, and be ready to start again.

There are many neighbouring districts, and even a few pupil teachers' centres, containing students, some of whom are examined in April and some in October.

Our plan will therefore be to set nearly the same work for both in our routines, and by this means everyone will have traversed the syllabus twice over. There will also be no routines for April and October, these months being left for revision.

Naturally, the first things to be provided in entering upon a new year are the additional text-books required, and these should be the best of their kind. Within, of course, reasonable limits the price should not be regarded. The pupil teacher is not situated as is the schoolmaster when selecting reading books. The former has only one copy to procure, the latter perhaps hundreds.

The following works are strongly recommended :—

Dunstan's Music Manual.
Gladman's School Management, Bailey's 'How to Teach the Babies,' Heller's Code.
Boyd Carpenter's British History.
Sanderson's History or Ross' Larger History, Curtis' Date Book or Blanchard's Notabilia of History.
Gregory's Physiography, Brook's Text Book of Geography for Pupil Teachers, W. and A. K. Johnston's Multum in Parvo Atlas, and Blanchard's Notabilia of Geography.
Todhunter's Mensuration.
Dixon and Beach's Arithmetic, Pendlebury's Arithmetic.
Deighton's Euclid, Egan's Deductions, Part I.
Hamblin Smith's, Charles Smith's or Hall and Knight's Algebra.
Dr. Beach's Elements of English, Dawson's Paraphrasing.
Professor Darqué's French Course, La Jeune Sibérienne (Pitt Press).
Hughes' Art of Handwriting, Hughes' Pupil Teachers' Copybook.
Halford-Hawkin's Art of Reading and Reciting.
Stormonth's Dictionary.

Throughout our course we shall assume that every pupil teacher will not only desire to pass in the compulsory subjects, but also to secure the marks awarded for music (at all his examinations), drawing, science, and language at the scholarship examination.

Very earnestly we urge that these extra subjects should not be deferred, but begun even by the youngest pupil teacher or candidate. Commonly, the knowledge obtained previous to apprenticeship suffices to carry one without effort through the first and second years. In fact, to an intelligent ex-Standard VII. scholar, there is nothing in the first year to take him more than six weeks, and in the second year two months of work.

Many, therefore, within our own knowledge, simply idle away these two first and most precious years, and then in their third year awake up, startled to find themselves within sight of the scholarship examination. These, therefore, commence with a feverish energy to obtain 'the extras,' and naturally they overload the ship, and they founder.

To the pupil teacher just through his third year examination we say, 'Don't rest on your oars, but commence a scholarship course at once, either the one in this journal or some other, and don't put it aside even for a fortnight.

1. It is believed that the following Routine is a material improvement on our last, and we have heartily to thank those correspondents, whose suggestions have contributed to this amelioration, especially H. Farish, Esq., B.A., Head Master of the Manchester Pupil Teachers' School, who has kindly assisted me by forwarding his routines, etc.

2. The Fourth Year is not included, as it is dealt with in the Scholarship Article.

3. The subjects taken by both boys and girls are set for the same time.

4. Time has been set apart for all the extra subjects which carry marks, viz., Music, Drawing, Science, and Language.

5. These extra subjects are set for Saturday, as many pupil teachers attend classes for them on that day.

6. A Scripture lesson is allowed for.

7. A considerable number of hours is devoted to subjects in advance of the syllabus.

8. Only a lunar, not a calendar month, is utilised.

9. From '*Remarks 7 and 8*' it will be noted that there is great elasticity in the Routine, and that no one need fall behind, there being so many opportunities of overtaking arrears of work.

10. It is not supposed that every detail will suit everybody, but a very little ingenious substitution will enable it to be adapted to all.

11. Every subject is taken up in, as the compiler conceives, due proportion to its weight, the more important subjects appearing oftener than the others.

12. Taking all the Routines together, it will be found that the girls have more time arranged for their weaker subjects, such as Arithmetic, History and Geography, than the boys.

13. The compiler guarantees that the whole Syllabus is thoroughly covered, often more than once, by the end of March.

PUPIL TEACHERS' ROUTINE FOR NOVEMBER.

DAYS	YEARS	FIRST WEEK			SECOND WEEK			THIRD WEEK			FOURTH WEEK		
		1st Lesson	2nd Lesson	3rd Lesson	1st Lesson	2nd Lesson	3rd Lesson	1st Lesson	2nd Lesson	3rd Lesson	1st Lesson	2nd Lesson	3rd Lesson
Monday	1	Analysis and Parsing	Measures and Multiples. Practice	Literature, Repetition, and Writing	Analysis and Parsing	How to teach Reading	History from 78 to 121 A.D.	Analysis and Parsing	How to teach Writing	Geography of British North America	Composition or Paraphrasing	How to teach Arithmetic	Physical Geography of Mountains
	2		Theory of Proportion. Multip. of Vulgar Fractions			How to teach Geography	History from 1087 to 1106 A.D.			Geography of India			Longitude
	3		Square Root. Addition and Subt. of Decimals				History from 1510 to 1535 A.D.		How to teach Grammar	Geography of Africa		How to teach Composition	Winds
Tuesday	1	½ of Euclid's Def. Book I. Garment with req. stitches	Geography of England	Scripture, or Revision	½ of Euclid's Def. Garment with req. stitches	Geography of England	Scripture or Revision	Post. & Ax. of Euc. Book I. Garment with req. stitches	Any Revision	Scripture or Revision	Euc., Bk. I., Prop. 1. Stocking-hole Mending	Add. of Algebra. Garment with required stitches	Scripture or Revision
	2	½ of Euclid's Def. Book I. Garment with req. stitches	Geography of Europe		All Euclid's Def. Garment with req. stitches	Geography of Europe		Props. 1 & 2 Euclid Book I. Garment with req. stitches			Euc., Bk. I., Props. 3, 4. Calico Patch	Subt. of Algebra. Garment with required stitches	
	3	Revise first 13 Props. Garment with req. stitches	Geography of Asia		Revise first 26 Props. Garment with req. stitches	Geography of Asia		Props. 29, 30, Euc. Book I. Garment with req. stitches			Euc., Bk. I., Props. 31, 32. Hedge-tear Darn	Multip. of Algebra Garment with required stitches	
Wednesday	1	History from 55 B.C. to 78 A.D.	Introductory Algebra to end of Addition. Garment with the required stitches	Any Advanced Work	Dates from 55 B.C. to 121 A.D.	Composition or Paraphrasing	Any Advanced Work	History from 121 to 410 A.D.	English from Text Book	Any Advanced Work	History from 410 to 787 A.D.	Prefixes, Roots, or Affixes	Any Advanced Work
	2	History from 1066 to 1087 A.D.			Dates from 1066 to 1106 A.D.			History from 1106 to 1153 A.D.			History from 1153 to 1189 A.D.		
	3	History from 1485 to 1510 A.D.			Dates from 1485 to 1535 A.D.			History from 1535 to 1553 A.D.			History from 1553 to 1572 A.D.		
Thursday	1	Simple Practice	Introductory Algebra to end of Addition. Garment with the required stitches	Map of England	Addition and Subtraction of Algebra. Garment with required stitches	Euclid Definitions. Book I. Garment with req. stitches	Any Revision	Political Map of England	Composition or Paraphrasing	Literature, Repetition, and Writing	Geography of England	Literature of Anglo-Saxon Period	Any Revision
	2	Mixtures. The different kinds of Vulgar Fractions		Map of France		Post. and Axioms. Book I. Garment with req. stitches		Map of France			Geography of Europe	Literature of Norman Period	
	3	Square Root. Multiplication of Decimals		Map of India		28 Props. Book I. Garment with required stitches		Map of India			Geography of Asia	Literature of Tudor Period	
Friday	1	Measures and Multiples, Practice	Any Advanced Work	Any Advanced Work	Common Denom., Bills of Parcels, and Lowest Terms	Any Advanced Work	Any Advanced Work	Addition of Vulgar Fractions. Practice	Any Advanced Work	Any Advanced Work	Subt. of Vulgar Fractions. Bills of Parcels	Dates from 121 to 410 A.D.	Any Advanced Work
	2	Simple Proportion Division of Fract.			Simple Proportion. Multiplication of Vulgar Fractions			Comp. Proportion Division of Vulgar Fractions			Compound Proportion. Complex Fractions	Dates from 1106 to 1189 A.D.	
	3	Mensuration of Squares. Division of Decimals			Mensuration of Rects. Mult. and Div. of Decimals			Equat. of Paymts. Reduct. of Vulgar Fract. & Decimals			Present Worth. Reduct. of Vulgar to Dec. Fractions	Dates from 1535 to 1572 A.D.	
Saturday	1	Language	Science	Drawing	Language	Science	Drawing	Language	Science	Drawing	Language	Science	Drawing
	2		Music			Music			Music			Music	
	3												

A FEW SUITABLE QUESTIONS.

FIRST YEAR.

1. *Boys.*—Add together $\frac{1}{8}+\frac{1}{2}$ of $3\frac{1}{3}+\frac{1}{3\frac{1}{3}}-\frac{2\frac{1}{2}}{9}$—Ans. 2.

Girls.—10¼ ribs of beef at 11d. per lb.; 7¾lbs. of mutton at 8d.; 2½lbs. rump steak at 1s.; 5¾lbs. neck of mutton at 9d.; 1½lb. of suet at 11d.; 3¼lbs. of veal cutlets at 1s.—Ans. £1 6s. 0d.

2. Write in Largehand, as a specimen of copy-setting, the word *Allegorically.*

Write in Smallhand, as a specimen of copy-setting, the phrase, '*The ancient sybil up and spoke.*'

3. Analyse the following passage, and parse the italicised words:—

Now the *rich* stream of music *winds along*,
Deep, majestic, smooth *and strong;*
Through verdant *vales* and *Ceres'* golden *reign*,
Headlong, impetuous *see it pour.*

4. Draw a map of the six Northern Counties of England.

5. What Roman and Celtic remains do we still possess in Britain?

6. Write an Essay on 'Manufactures.'

SECOND YEAR.

1. *Boys.*—If 3 boats take 6,000 herrings in 8 days, how long will 600 boats be in taking 20,000 barrels, each containing 700 herrings?—Ans. 93⅓ days.

$\frac{(3\frac{1}{3}-2\frac{1}{2})\div\frac{5}{6}\text{ of }\frac{3}{5}}{2\frac{2}{3}\div(\frac{1}{2}+\frac{1}{4})}$—Ans. $\frac{1}{4}$.

2. Writing as in First Year.

3. Paraphrase this passage:—

'The curfew *tolls* the knell of *parting* day,
The lowing *herd* winds *slowly o'er* the lea.
The ploughman *homeward* plods *his* weary *way*,
And leaves the world to darkness and to *me.*
Save that from yonder *ivy-mantled* tower
The moping owl does to the moon *complain*
Of *such as, wandering* near *her* secret bower,
Molest her *ancient* solitary reign.

and parse the italicised words.

4. What are the capitals of France, Austria, Sweden, Italy, Greece, Roumania, Bulgaria?

5. Give the areas of the Baltic, Mediterranean, and Black Seas, and their boundaries.

6. What are the dates of Tenchebrai, Constitutions of Clarendon, Murder of Becket, and Accession of Richard I.?

7. Write out from memory Euclid I., 4.

8. Write out Notes of a Lesson on Simple Addition.

9. What are the intervals between each step of the common scale?

10. Give the Imperfect of *Avoir*, or decline *Mensa.*

THIRD YEAR.

1. *Boys.*—Find the present worth of £3,171 14s. 0d., due five years hence at three per cent.—Ans. £2,758.

Girls.—Reduce $4\frac{17}{315}$ and $5\frac{5}{540}$ to decimals.—Ans. 4·05536; 5·07962.

2. Writing as in Second Year.

3. 'It *is* said every *figure* must *be* essentially *defective* in *some* of the attributes of the *original, as*, for example, in *the* representation of the projection of objects.'

Analyse the above passage, parse the italicised words, and pick out the Latin prefixes, giving their exact force in each case.

4. Draw a map of the Ganges, and state what you know of Monsoons.

5. Narrate Henry VIII.'s quarrel with the Papacy.

6. Write a short essay upon 'Absolute Truthfulness.'

7. *Boys.*—What are the criticisms of Axiom XII? What might be substituted for?

8. *Girls.*—Describe any one of the required stitches.

9. *Girls.*—What are the ordinary precautions taken to prevent the spread of Small Pox?

10. Write notes of a lesson on 'The Asiatic Races.'

11. *Boys.*—Expand $(2x-7)^4$.—Ans. $16x^4-224x^3+1176x^2-2744x+2401$.

12. *Boys.*—One side of a rectangle is ⅘ of the other side, and the diagonal is 100 yards long. How long is each side? Ans. 60 and 80 yards.

13. Write out the major scales of A and E♭; *or* state the mental effects of Soh, Lah, Fah, and Te.

14. Give the Present Indicative of *Aller* or of *Amo.*

—o—

THE 1892 SCHOLARSHIP EXAMINATION.

BY DR. GEORGE BEACH, M.A.

Co-Author of 'A Manual of our Mother Tongue,' 'A Girl's Arithmetic,' Author of 'Elements of English,' 'Entertaining Readers,' etc.

1. For the ladies we continue from our last article the analysis of all the questions set at the Scholarship Examination by the Education Department for the last twenty years on the subject *Domestic Economy.*

Preparation of Food.—Cooking Utensils; The Oven; Methods of Cooking, with the time required for the various joints, and the applicability, advantage, or drawbacks of these methods; How to cook fish, potatoes, green vegetables, poultry, and butcher's meat; Recipes for batter pudding, plum pudding, rice pudding, potato pie, pea soup, ordinary soup, mutton broth, beef tea, barley water, oatmeal porridge; How to make bread; Manufacture of cheese; How to preserve foods; Utilisation of scraps of meat, bread, dripping; Employment of condiments; Hot *versus* cold food; Why are the French better cooks than we? Series of dinners for lone teachers.

Health.—Simple rules for preservation of health; Preservation of health of teachers and scholars; Effect of good temper upon health; Sensible clothing; Fashionable clothing; Danger of Schoolroom being cloakroom; Importance of physical training, regular exercise, and special exercises for infants and girls; Supervision of Playground sports; Early rising; Evils of flat desks; Personal cleanliness; Cleanliness of premises; Temperature and fixing of baths; Lighting, Ventilating, and Draining of premises.

Sickness, etc.—Cases of emergency, such as Burns, scalds, drinking boiling water, cuts, choking, stunning, fainting, convulsions, and sprains; Improvisation of a stretcher; Symptoms and first treatment of whooping cough, measles, croup, small-pox, typhus fever, and scarlatina; Precautions against infection and contagion; Disinfectants; Nursing of convalescents.

Clothing.—Use of clothing; Clothing for head, body, feet; Suitable clothing for teachers; Origin, preparation, use, selection of clothing materials; Quantity required, and cost of materials for ordinary garments; Removal of grease, ink spots, and stains.

Washing.—Advantages or otherwise of a washing-machine; Appliances for washing; What articles must be washed by hand? What articles must be washed without soap or without soda? What articles must not be starched, mangled, or long-dried? Preparation for washing-day; A Schoolmistress' washing-day; Special washing of Blankets, prints, woollens, linens, muslins; Getting-up of Linen.

If these details be added to those of last month, they present a formidable front; but if the domesticated Pupil-Teacher will carefully look them through, she will be astonished to find how much common sense and practice has already taught her respecting them. The time allowed for Domestic Economy in our Routines will amply suffice for the theory and book work required.

2. Examples of the Latin Subjunctive.

(*Cæsar, Book I., Paragraph* 14.)

(*a*) Commemorassent.	Subjunctive, the Verb of a Relative Sentence in Oratio Obliqua.
(*b*) Teneret.	Verb of an Adverbial Sentence in Oratio Obliqua.
(*c*) Accidissent.	Verb of a Relative Sentence (*quo* —) in Oratio Obliqua.
(*d*) Fuisset.	Verb of Conditional Sentence in Oratio Obliqua.
(*e*) Intelligeret.	After *quod*, meaning because in Oratio Obliqua.
(*f*) Timeret.	After *quare*, questioning *Indirectly*.
(*e*) Putaret.	After *quod*, meaning because in Oratio Obliqua.
(*d*) Vellet.	Governed by *si* conditional.
(*f*) Tentassent.	After *quod*, meaning because in Oratio Obliqua.
(*f*) Vexassent.	
(*g*) Gloriarentur.	Governed by *quod*, meaning 'as to.'
(*g*) Admirarentur.	
(*h*) Doleant.	Subjunctive after *quo* 'so that' by which.
(*i*) Velint.	Verb of Relative Sentence in Oratio Obliqua.
(*e*) Sint.	Governed by *cum*, meaning 'since,' 'although.'
(*d*) Dentur.	A Verb of a Conditional Sentence.
(*i*) Polliceantur.	Verb of Relative Sentence in Oratio Obliqua.
(*h*) Intelligat.	Governed by *uti*, meaning 'in order that.'
(*i*) Intulerint.	Verb of Relative Sentence in Oratio Obliqua.
(*d*) Satisfaciant.	A Verb of a Conditional Sentence.
(*f*) Consuerint.	After *uti*, meaning that.

(*a*) The Relative takes the Subjunctive in stating the reason of something, 'O fortunate adolescens, qui tuæ virtutis Homerum præconem inveneris' = 'O fortunate young man who hast found (*i.e.* in that thou hast found) a Homer to be the herald of thy prowess.'

(*b*) The Subjunctive is used as not being so strong as the Indicative; Cæsar does not want too plainly to declare his animosity.

(*c*) After quo = quod.

(*d*) Denoting hypothesis.

(*e*) Doubt or uncertainty.

(*f*) Reason.

(*g*) Quod is used after such verbs as, gratulor, glorior, queror, to denote that the congratulating, boasting, etc., proceeds from someone not the speaker.

(*h*) Purpose.

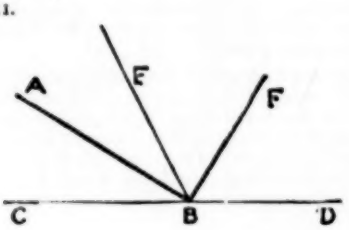
(*i*) The Subordinate Verbs in Relative Sentences, used by the original speaker in the Indicative Mood, are turned into the Subjunctive in the Oratio Obliqua.

(*j*) The Subjunctive is employed in statements based upon other people's authority, not being consecutive.

Alternative Methods.

III. Euclid (*cont.*).

Prop. 11.



Let AB be the given straight line. It is required to draw from B, the line BF at right angles to it.

Construction. Through B draw any line CBD. Make ∧ EBA = ∧ CBA.

Bisect ∧ EBD by line BF.

Then FBA is a right ∧.

Proof. ∧ ABC = ∧ EBA, and ∧ FBE = ∧ FBD.

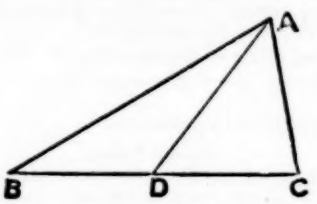
∴ ∧ EBA + ∧ FBE = ½ (∧ EBC + ∧ EBD).

∴ ∧ FBA = ½ of 2 rt ∧s.

∴ ∧ FBA = a right angle. Q. E. D.

N.B. This proof is quite logical, for none of the principles employed in the construction depend upon Prop. XI.

Prop. 17.



Let ABC be any Δ. Then ∧ ABC + ∧ ACB are less than 2 rt ∧s.

Proof. In BC take any point D and join AD.

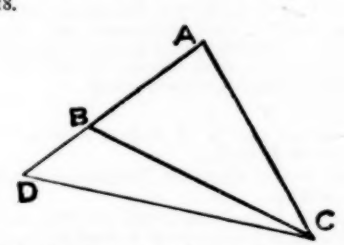
∧ ADC > ∧ ABC, and ∧ ADB > ∧ ACB (I. 16).

∴ ∧ ADC + ∧ ABD > ∧ ABC + ∧ ACB.

But ∧ ADC + ∧ ADB = 2 rt ∧s (I. 13).

∴ 2 rt ∧s > ∧ ABC + ∧ ACB. Q. E. D.

Prop. 18.



Let ABC be a triangle, having AC greater than AB.

Then ∧ ABC > ∧ ACB.

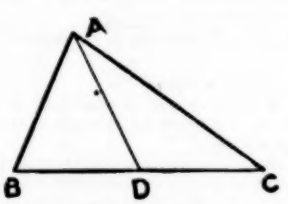
Proof. Produce AB to D, making AD = AC. Join DC.

Then ∧ ADC = ∧ ACD (I. 5), and ∧ ACD > ∧ ACB.

∴ ∧ ADC > ACB. But ∧ ABC > ∧ ADC (I. 16).

∴ ∧ ABC > ACB. Q. E. D.

Prop. 20.



Let ABC be a Δ, then any two sides together (such as BA + AC) shall be greater than the third (BC).

[In some Euclids a straight line is defined to be '*The shortest distance between two points*,' and then this proposition requires no proof. In truth it is a theorem perpetually used by all locomotive animals.]

Proof. Bisect ∧ BAC by line AD meeting BC in D.

∧ ADC > ∧ BAD (I. 16); but ∧ BAD = ∧ CAD; ∴ ∧ ADC > ∧ CAD ∴ CA > CD (I. 19).

Again. ∧ ADB > ∧ CAD (I. 16); but ∧ CAD = ∧ BAD; ∴ ∧ ADB > ∧ BAD ∴ BA > BD (I. 19).

∴ also (AC + AB) > (BD + DC) ∴ (AC + AB) > BC.

Q. E. D.

SCHOLARSHIP ROUTINE FOR **NOVEMBER**, 1891.

DAYS	FIRST WEEK				SECOND WEEK				THIRD WEEK				FOURTH WEEK			
	I.	II.	III.		I.	II.	III.		I.	II.	III.		I.	II.	III.	
MONDAY	H.C.F. & L.C.M. of Algebra. Questions on Needlework	History from 1867 to 1891	Language		Simultaneous Equations of the First Degree. Ingredients of Food	Dates from 1867 to 1891	Language		Quadratic Equations. Rules of Health	England under the Stuarts	Language		Problems involving Quadratic Equations. Any Revision	Lives of Great Men	Language	
TUESDAY	Props. 10 to 14 of Euclid, Book II. Knitting	Revise Geography of Asia	Science		Props. 1 to 7 of Euclid, Book II. Patterns of Boy's Shirt & Woman's Nightgown	Geography of Polynesia	Science		Props. 9 to 14 of Euclid, Book II. Patches	Latitude and Longitude	Science		Revise Any Euclid. Patches	Winds and Currents	Science	
WEDNESDAY	Stocks	History of English Language	Drawing		Division into Proportional Parts	Paraphrasing and Repetition	Drawing		Compound Interest	English Composition	Drawing		Miscellaneous Arithmetic	English Composition	Drawing	
THURSDAY	Simultaneous Equations of the First Degree	History from 1867 to 1891	Language		Problems leading to Simultaneous Equations of the First Degree	England under the Tudors	Language		Quadratic Equations	England under the Stuarts	Language		Problems involving Quadratic Equations. Any Revision	Lives of Great Men	Language	
FRIDAY	Definitions, Axioms and Postulates of Books I. and II., Euclid. Calico Sampler	Revise Geography of Africa	Science		Props. 1 to 26 of Euclid, Book I. Flannel Sampler	Map of United States	Science		Props. 27 to 48 of Euclid, Book I. Diagram of Chemise	Physical Geography of Mountains and Rivers	Science		Any Deductions. Diagram of Night Shirt	Map of Australia	Science	
SATURDAY	Present Worth and Discount	Parsing and Analysis	How to teach Reading to Standard I.	Repetition and Literature	Mensuration of Parallelograms. Problems of Motion	Greek Prefixes and Affixes	Notes of Lesson on Writing to Standard II.	Music	Mensuration of Triangles. Simple Interest	Notes of an Object Lesson	Music	Any Revision	Mensuration of Irregular Figures. Compound Practice	Any History	Music	Repetition and Literature

SELECTED GOVERNMENT QUESTIONS.

First Week.

1. Paraphrase :—

Hadst thou but lived, though stripped of power,
A watchman on the lonely tower,
Thy thrilling trump had roused the land,
When fraud or danger were at hand ;
By thee, as by the beacon light,
Our pilots had kept course aright.

As some proud column, though alone,
Thy strength had propped the tottering throne :
Now is the stately column broke,
The beacon light is quenched in smoke,
The trumpet's silver sound is still,
The warder silent on the hill.

2. Explain the force of the roots in the following words :—*crescent, abdicate, reduction, descend, obvious, negation, prevent.*

3. Draw a map of India.

4. Show as fully as you can whence we obtain our supplies of wheat, silk, mahogany, wine, cheese, oranges, spice, maize and dried fruits.

5. What directions would you give for the daily and weekly cleaning of a schoolroom? What additional cleaning is needed at longer intervals?

6. Name five or six portions of plays of Shakespeare suitable for scholars in the Fifth and Upper Standards. Show how you would handle one of those selected.

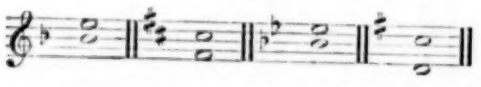
7. What reigns are most remarkable for an increase in the powers of Parliament? Compare the Parliaments of Henry VIII. and Charles II.

8. Explain what is meant by the Star Chamber Bill of Attainder, Habeas Corpus, Ship Money, Act of Supremacy, and Poyning's Law.

9. Describe the intervals (major third, etc.) formed by the following pairs of notes :—

(For Tonic Sol-faists)

f	s	t	f	
t_1	r	m	s_1	



10. Find the least number which if multiplied by 43 and divided by 41 leaves a remainder of 18. Ans. 9.

11. By what different methods may the following sum be worked? Give your reasons for preferring the one you adopt. Estimate the cost of constructing a telegraph for a distance of 84·4125 miles at the rate of £4 16s. 7½d. per chain. Ans. £32,625 8s. 7½d.

12. Explain what is meant by *premium* and *discount* in speaking of *Stock*. If I purchase £1,000 Three per Cents. at a discount of 3½ per cent., and selling out again after the stock has fallen to 82¾, invest the proceeds in Three and Three-quarters per Cents. at *par*, what do I lose in capital by the whole transaction, and what do I gain in income? Ans. £137 10s. ; £1 0s. 7½d.

13. (*Men only.*) Define parallel straight lines. To draw a straight line through a given point parallel to a given straight line.

A is a point without the angle CBD. Draw from A a straight line AEF, cutting BC in E, BD in F, so that AE may = EF.

(*Women only.*) Name and fully describe all stitches used in completing a woman's night-dress.

14. (*Men only.*) If the square described on one of the sides of a triangle be equal to the squares described on the other two sides of it, the angle contained by these two sides is a right angle.

PQRS is a rectangle, T any point. Show by I. 47 that the squares on TP, TR are together = to the squares on TQ, TS.

(*Women only.*) What are the preparations and materials needed for a mixed washing? State shortly the advantages and disadvantages of soda.

15. (*Men only.*) A cottage which stands on a square plot of 729 ft. contains four rooms of equal size on the ground floor, and is divided into two equal parts by a passage 4 ft. wide, having two rooms on each side. Find the area of each of the four rooms, allowing one foot for the thickness of each wall.

Ans. 140½ sq. ft.

(*Women only.*) Describe fully the different stages of instruction by which a child would advance from her first lesson in knitting, to making a stocking for a full grown man.

16. (*Men only.*) Prove that if c be a common measure of a and b, it will also measure $ma \pm nb$. Find the G.C.M. of $6x^3 - 10x^2 + 10x - 4$ and $9x^2 + 3x^2 + 3x - 6$. Ans. $3x - 2$.

17. (*Men only.*) Prove the rule for dividing one fraction by another.

Simplify $\left(\frac{1}{m} + \frac{1}{n}\right)\left(a + b\right) - \left(\frac{a+b}{m} - \frac{a-b}{n}\right)$

Ans. $\frac{2a}{n}$

Second Week.

1. Classify Adjectives. How are they inflected? How would you parse the word *white* in the sentence 'I painted my house *white*'?

2. Give a short historical sketch, with dates, of the origin and growth of the English language.

3. Say what you know about each of the undermentioned places :—

Aden, Florence, the Campagna, Granada, the Deccan, the Fens, the Black Country, the Peak, Londonderry, the Trossachs, Coventry, and Plymouth.

4. Explain briefly the terms : *inferior planet, phases of the moon, perigee, morning star, neap tides* ; and draw diagrams illustrating the second and last.

5. What are the commonest faults found in the reading of children? How would you correct those faults?

6. State the requirements of the Code in the Geography of the Fourth and Fifth Standards, and say how Geography may be made useful and interesting to children.

7. State briefly of each of the following (*a*) When he lived ; (*b*) With what political or social questions his name is associated :—*Milton, Locke, Hume, Clarendon, Burnet, Burke, Cobden, Dr. Arnold, Howard.*

8. Explain the terms *Lollards, Roundheads, Regicides, Pilgrim Fathers, the Cabal.* Name the reigns to the history of which each belongs.

9. Write the scale of E♭ Major.

(*For Sol-faists.*) Describe the mental effects of Fah, Te, Me.

10. Two gallons of a mixture of spirit and water contain 12 per cent. of water, and are added to three gallons of another mixture containing 7 per cent. of water ; to the whole is then added half a gallon of water. Find the percentage of water in the resulting mixture. Ans. 17$\frac{8}{11}$ p.c.

11. Give Notes of a Lesson on Long Division.

12. Find the discount on £160 10s. 0d. due two years hence at 3½ p.c. simple interest. Ans. £10 10s. 0d.

13. (*Men only.*) Write out Euclid I. 4.

ABCD is a square, ABE an equilateral triangle. If EC, ED be drawn the triangle DEC is isosceles. It may be assumed that an equilateral triangle is also equiangular.

(*Women only.*) Compare the relative advantages as regards salary to a schoolmistress of (*a*) a country school with a teacher's house and £60 per year, and (*b*) a town school with no house and £90 per year.

14. (*Men only.*) Write out Euclid ii. 5.

From the vertex of an isosceles triangle a line is drawn to any point in the base. The square on a side of the triangle is equal to the square on the line so drawn together with the rectangle contained by the segments into which the base is divided.

(*Women only.*) What dangers to health are likely to accrue in a school where there are no lobbies or porches for clothes, and where the desks are flat, and occupy nearly all the floor space and face the windows?

15. (*Men only.*) The circumference of a circular field is 252 yards. If the field be worth £48 16s. 0d. find the value of a similar circular field whose circumference is 315 yards. Ans. £76 5s. 0d.

(*Women only.*) Give the materials, with quantities, for a plum pudding for a family of six.

16. (*Men only*). Solve $\frac{ax^2 + bx + c}{px^2 + qx + r} = \frac{ax + b}{px + q}$ Ans. $\frac{rb - cq}{pc - ra}$

17. (*Men only.*) The length of a field is twice its breadth. Another field, which is 50 yards longer and 10 yards broader, contains 6,800 square yards more than the former. Find the size of each.

Ans. 90 yards by 180 yards, and 100 yards by 230 yards.

Third Week.

1. Show by examples the different uses which may be made in English of the words *what* and *that*. Parse the sentence:

What seemed his head
The likeness of a kingly crown had on.

2. If you think there is anything wrong in any of the following sentences, correct it, and give your reasons:—

(*a*) I should have liked to have seen so fine a sight.

(*b*) I do not think him a reliable person.

(*c*) There let him lay.

(*d*) He preferred to know the worst, than to dream the best.

(*e*) The courage of the soldier and of the citizen are essentially different.

(*f*) Each thought of others rather than of themselves.

3. Draw a map of the Irish Sea.

4. State briefly what is meant by constant winds and ocean currents. The Gulf Stream is said to influence the climate of these islands. How would you explain this?

5. What is the use of '*Learning by heart*'? Name some things which ought, and others which ought not to be so learned. Give your reasons.

6. What sort of sketch should appear on the blackboard at the end of a collective lesson on the Ocean? What is the best use to make of such a sketch after it is written?

7. Arrange in chronological order and give the dates of the following events:—Execution of Mary, Crecy, Flodden, Boyne, Deaths of Knut and Henry VIII., the introduction of printing, the peace of Amiens, the peace of Ryswick, Abolition of the Slave Trade, Magna Charta, Solemn League and Covenant.

8. Write short accounts of Raleigh, Hampden and Falkland.

9. Write any form of the scale of B minor, ascending and descending.

(*For Sol-faists.*) Name (1) the minor sixth and (2) the major seventh of the Lah or minor mode.

10. 684 policemen are to be distributed among three towns in proportion to their population—viz., 10,944, 12,312, 25,992. How many will be sent to each town? Ans. 152, 171, 361.

11. (*a*) Prove the rule for finding the vulgar fraction equivalent to ·27 Ans $\frac{3}{11}$

(*b*) Define *ratio, proportion, interest and discount.*

12. Give the equivalents of the following decimal expressions in English money; and of the following sums of money in decimals of a £ by mental calculation only:—

(*a*) £16·25; £1·025; £7·16; £2,034·875.
Ans. £16 5s. 0d.; £1 0s. 6d.; £7 3s. 4d.; £2,034 17s. 6d.

(*b*) £2 12s. 6d.; £134 10s.; 7s. 6d.; £1. 1s. 0d.
Ans. £2·625; £134·5; £·375; £1·05.

13. (*Men only.*) Any two sides of a triangle are greater than the third side.

AB bisects CD at right angles at B; P is a point within the angle ABC, and CP produced cuts AB at E. Show that the difference between ED and EP is greater than that between any other two lines drawn from P and D to meet AB.

(*Women only.*) On what grounds can a diet consisting wholly of vegetable food be defended? What objections to it can be fairly urged, and to persons of what class or age are such objections applicable?

14. (*Men only.*) Write out Euclid I. 29.

P is a point between two given parallel straight lines, such that any two straight lines drawn through P always intercept equal portions of the parallel straight lines. Show that P is equidistant from the parallels.

(*Women only.*) Describe fully the process of making bread, the materials to be employed, the time to be occupied in the process, and the appliances needed.

15. (*Men only.*) Show that the area of a triangle, whose sides are 26, 35, 51, is the same as the area of a right-angled triangle whose sides about the right angle are 7 and 120. Ans. 420 each.

(*Women only.*) What are the special advantages of fish as an article of food?

16. (*Men only.*) Solve $\frac{m}{x}+\frac{n}{y}=1$; $\frac{x}{m}+\frac{y}{n}=1$.
Ans. $x=y=m+n$.

17. (*Men only.*) Solve
$$5x-6y+4z=15$$
$$7x+4y-3z=19$$
$$2x+y+6z=46$$
Ans. $x=3$; $y=4$; $z=6$.

Fourth Week.

1. Write a letter or an essay on one of the following subjects:—*Singing Birds* or *Best way of spending holidays.*

2. Analyse the following passage and parse the italicised words:—

I *met* a traveller *from* an antique land,
Who said: '*Two* vast and trunkless legs of *stone*
Stand in the desert. *Near them* on the sand,
Half-sunk, a shattered *visage* lies, *whose* frown,
And wrinkled lip, and *sneer* of cold command
Tell that the *sculptor well Man's passions* read.'

3. Give notes of a lesson in Historical and Commercial Geography on South America.

4. Describe the situation and account for the names of *seven* of the following:—Lombard-street, Regent-street, Chester, Cologne, St. Petersburg, Constantinople, Alexandria, Virginia, Pennsylvania, Adelaide.

5. Show how you would group or classify the letters of the Alphabet for teaching the elements of writing to very young children.

6. Give some examples of suitable exercises in Mental Arithmetic, adapted for scholars of the 1st and 5th Standards respectively.

7. Write a brief account of the reign of Henry VIII., illustrating especially its despotic character.

8. Name, with dates, the chief events of the latter half of the eighteenth century.

9. Explain the following terms:—forte, diminuendo, largo, stringendo, ad libitum, vivace.

10. If I sell goods at a loss of 6¼ per cent. when I sell them for £18 15s. 0d., at what price must I sell to gain 6¼ per. cent.?
Ans. £21 5s. 0d.

11. If a is less than b, then the fraction $\frac{a}{b}$ is less than $\frac{a+1}{b+1}$ but greater than $\frac{a-1}{b-1}$ Prove this by reasoning.

12. A can mow 3½ acres in 5 days, B 2½ in 4 days, C 7½ in 8 days. How long will they take, working together, to mow 359 acres? If the wages are £89 15s. 0d., what ought to be the share of each? Ans. 160 days; £26, £25, £38 15s. 0d.

13. (*Men only.*) Write out Euclid I. 5.

The straight line which bisects the base of an isosceles triangle at right angles shall pass through the vertex.

(*Women only.*) Explain the principle of annuities immediate and deferred, giving an illustration of each method of investment. Which would be the better plan for an elementary teacher, and why?

14. (*Men only.*) Write out Euclid II. 4.

What is the corresponding formula in Algebra?

(*Women only.*) Summarise the advice you would give to a young girl going into service as to the choice of sensible, suitable, and economical clothing.

15. (*Men only.*) Show that the area of a triangle whose sides are in the ratio of 3 : 3 : 4 is greater than $\frac{4}{9}$ of the area of a square described on one of the shorter sides.

(*Women only.*) Give an exact statement of all the materials required, with the amount and cost of each, for the complete winter outfit of a girl of the artisan class aged ten. Add up the total cost.

16. (*Men only.*) There is a number consisting of two digits; the number is equal to three times the sum of its digits, and if 45 be added to the number the digits interchange their places. Find the number. Ans. 27.

17. (*Men only.*) Solve $\frac{6}{x}+\frac{x}{6}=\frac{5(x-1)}{4}$.
Ans. $x=3$, and $-\frac{21}{13}$

Correspondence.

See end of Certificate article.

THE 1891 CERTIFICATE EXAMINATION.

BY DR. GEORGE BEACH, M.A.,

Co-Author of 'Our Mother Tongue,' 'Arithmetic for Girls,' Author of 'Elements of English,' 'Entertaining Readers.'

I. KINDERGARTEN REMARKS.

(Adapted chiefly from an address by Madame Michaelis.)

The greatest mistake respecting Kindergarten that the unthinking teacher makes is to deem that she is employing Kindergarten methods simply because she is using the Kindergarten occupations and gifts.

Under this delusion she loads her table on examination day with plaited mats, straw frames, clay models, stick-and-pea work, etc., and fancies she is demonstrating to H.M. Inspector her continuous adherence to the Kindergarten system.

But all these results are merely material, and may be utterly useless. They are often of the earth earthy, instead of being merely the outward and visible sign of an inward and intellectual growth and refinement. They are the *end* instead of the *means*.

It is quite possible for a thoughtful mistress never to have heard of Froebel, never to have employed any of his gifts, and to come nearer to his spirit, his ideas, and the results he hoped for, than many a mechanical user of his materials.

The fundamental principles of the Kindergarten are :—

1. Every child is entitled to the most carefully devised education.

2. This education considers the 'all-sided' unity and harmony of the individual, and its unity and harmony with mankind as a whole.

3. To secure this education the child must be studied in relation to its material and social environments.

4. Child nature can be studied (*a*) from our own juvenile experiences. (*b*) From the recorded experiences of others. (*c*) From our own observation of children, especially in their unguarded moments when at play.

5. To a child play is helpful by being the most natural way by which it is able (*a*) to express its activity and give vent to its exuberance, and (*b*) to develop its powers, moral, mental, and corporeal.

6. To a teacher play is helpful, for by means of it (*a*) he learns the child's character, and (*b*) gains the child's confidence.

Every good teacher, even of elder scholars, watches and even joins in his scholars' pastimes, and it is a matter of experience that proper punishments of whatever kind are borne most patiently by, and are productive of the most good to those scholars whose teachers appear regularly in the playground.

But if the straw mats, the folded papers, etc., are not in themselves any good, of what use are the Occupations?

We reply :—

1. They satisfy the activity and surplus energy of the child.

2. They offer a field for the young mind's creativeness and investigativeness.

3. They foster the child's love of the beautiful, through colour, form, and number.

4. They exhibit the unity of creation through the correspondence of form and number.

5. They unfold the powers of observation and reason by their well-arranged sequence and continuity.

6. They teach the child to be neat, careful, patient, accurate, and contented.

7. They develop the emotional nature of the child by providing him with a means of working for others.

8. They train the eye and hand, and educe manipulative skill.

9. They contain all the *elements* of knowledge.

10. They give a better preparation for a future technical education than is ordinarily imparted.

If our Readers will turn to p. 17 of the July Number where a table of education, as shown to be necessary by man's constitution, is given, they will see how the Occupations correspond with the arrangement there given.

The child's BODY is trained (1, 8); the intellectual (2, 4, 5) and emotional (3, 7) sides of the MIND are regulated and developed, and the WILL is disciplined to moral ends (6), or strengthened by exercise.

II. LOGIC.

1. The *Comprehension* or *Connotation* of a term is the collection of all the simpler ideas which together make up the notion that the term signifies.

2. The *Extension* or *Denotation* of a term is the collection of all the individuals of which severally that term may be predicated.

3. By diminishing the Extension the Comprehension is commonly increased, and *vice versa*.

4. The simplest act of *thought* is a Judgment, which expressed in words is a *Proposition*.

5. A simple proposition by means of its *Predicate* asserts or denies something about its *Subject*.

6. A Singular Term is one which names an individual thing, as Socrates; a Common or Universal Term is one that applies to any one of a class, as thing, animal, man.

7. A singular proposition is one in which the Subject is Singular, as '*John is* tall.' For logical purposes singular propositions are regarded as universal, the subject being taken in its whole extension.

8. A universal proposition is one in which the Subject is a common term taken in its whole extension, as '[*All*] men are two legged.'

9. A particular proposition is one in which the Subject is a common term taken in part of its extension as, '*Some* metals are white.'

10. As propositions may be affirmative or negative, we have now *four kinds*.

(*a*) A universal affirmative as, All men are mortal.

(*b*) A universal negative as, No men are immortal.

(*c*) A particular affirmative as, Some men are just.

(*d*) A particular negative as, Some men are not just.

11. As every proposition, so also the terms of every proposition, are said to have a certain quantity; and a term of a proposition is universal if it be taken in that proposition according to its whole extension; particular, if it be not.

12. In every affirmative proposition the predicate is particular, in every negative, universal.

13. About inferring the truth or falsehood of derived propositions there are the following axioms :—

(*a*) The truth of the universal infers the truth of the particular. If it be true that *Every man is an animal*, it is true that *Some men are animals*, or that *Some man is an animal*.

(*b*) The truth of the particular does not infer the truth of the universal. It may be true that *Some* men are just, but it does not follow that *All men are just*.

(*c*) The falsehood of the particular infers the falsehood of the universal. If it be false that *Some man is a stone*, it is also untrue that *All men are stones*.

(*d*) The falsehood of the universal does not infer the falsehood of the particular. If it be false that *All men are just*, it may be true that *Some men are just*.

14. CONVERSION is the transposition of the subject into the place of the predicate, and of the predicate into the place of the subject, so as to preserve logical truth.

(*a*) A converted universal affirmative becomes particular. *Every man is an animal* means really Every man is [*some*] animal (12), so being converted it becomes *Some animal is a man*.

(*b*) A universal negative becomes a universal negative (12). *No man is a stone*, becomes *No stone is a man*.

(*c*) A particular affirmative is converted into a particular affirmative (12). *Some metal is white* becomes Some white [thing] is a metal.

(*d*) A particular negative cannot be converted, for its subject is particular and its predicate universal (12), but being converted the particular subject would become a particular predicate of a negative proposition, which is impossible (12) *e.g.*, *Some men are not just* being converted would become *Some just* [*things*] are not men. Now this is illogical, because the original particular negative proposition, *Some men are not just*, does not deny the particular affirmative, *Some men are just*.

15. OPPOSITION is a disagreement as regards affirmation and negation between propositions that have the same subject and the same predicate as *Every man is an animal*, *Every man is not an animal*, or *No man is an animal*.

16. The kinds of opposition are between
(I.) Two universal propositions.
(II.) Two particular propositions.
(III.) A universal and particular proposition.

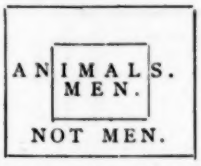
Case I. Both propositions (*a*) may be false, (*b*) one may be true, but (*c*) both cannot be true

(*a*) *All men are just* ; *No man is just* are both false.

(*b1*) *Every man is a stone* is false, but *No man is a stone* is true.

(*b2*) (*b*) *Every man is an animal* is true, but *No man is an animal* is false.

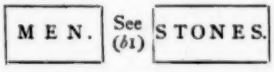
(*c*)



See (*b2*).

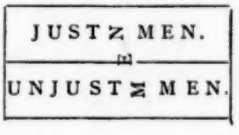
If the Predicate agree with the entire subject, the affirmative will be true and the negative false.

If the Predicate disagree with the entire subject, the negative will be true and the affirmative false.



See (*b1*)

If the Predicate partly agree and partly disagree, both propositions will be false.



See (*a*)

Case II. Both propositions (*a*) may be true, (*b*) one may be false, (*c*) both cannot be false.

(*a*) *Some men are just*, *Some men are not just*, both are true.

(*b*) *Some men are stones* is false, but *Some men are not stones* is true.

(*c*) If the Predicate agree with the entire subject, the affirmative will be true and the negative false, as :—*Some men are animals* is true, but *Some men are not animals* is false. See Figure 1, *Case* I. (*c*).

If the Predicate disagree with the entire subject, the negative will be true, and the affirmative false, as :—*Some men are stones* is false, but *Some men are not stones* is true. See Figure 2, *Case* I. (*c*).

If the Predicate partly agree and partly disagree, both will be true. See *Case* II. (*a*), and Figure 3, *Case* I. (*c*).

Case III. (*a*) One is always false, and (*b*) one is always true.

If the Predicate agree with the entire subject, the affirmative will be true and the negative false, as :—*Every man is an animal* is true, but *Some men are not animals* is false. See Figure 1, *Case* I. (*c*).

If the Predicate disagree with the entire subject, the negative will be true and the affirmative false, as :—*Some man is a stone* is false, but *No man is a stone* is true. See Figure 2, *Case* I. (*c*).

If the Predicate partly agree and partly disagree, the particular will be true, and the universal false, as :—*Some men are just* is true, but *No man is just* is false. See Figure 3, *Case* I. (*c*).

QUESTIONS FOR FIRST YEAR.

First Week.

1. When and by whom should the daily attendance and absence of scholars be marked and verified? How would you endeavour to secure correct marking, and what should be done in case of error, or the withdrawal of a child during school hours?

2. What do you consider to be the daily duty of a Head-Teacher with regard to absentees?

3. State what you know of the sources whence Tennyson procured the material for his Idylls.

4. Explain the following passages :—*Light of the sense, wild justice, quanta patimur, consultations are more indifferent, primum mobile, used to donatives ;* contrive some false *periods of business, Nebuchadnezzar's tree.* (*Men only.*)

Sketch in outline the characters of any three of Johnson's friends. (*Women only.*)

5. Mention any phenomenal tides and explain their causes.

6. Draw a map of Egypt.

7. Give the dates of Magna Charta, Agincourt, Wolsey's Chancellorship, Sheriffmuir, and Waterloo.

8. Who were the Queens of William Conqueror, Henry I., Richard I., Henry VIII., William III., Prince George of Denmark, and the Prince Consort?

(*Men only.*) Mention our naval victories between 1789 and 1820.

9. If there were a coin worth 1¾d., how many such coins would be equal in value to 595 French francs, reckoning 25 francs = £1 ? Explain why it is, that although you can divide one sum of money by another, you cannot multiply one sum of money by another.
Ans. 3,264.

10. What will be the cost of painting a room 22 ft. long, 18 ft wide, and 11 ft. high, at 2s. 3d. per square yard, allowance being made for two windows, each 6 ft. by 4 ft., and a fireplace 6 ft. by 5 ft.?
Ans. £10. 0s. 6d.

(*Men only.*) The expenses of farming are four times as great as the rent. What is the rent of a farm of 400 acres, if the farmer clears 10s. per acre, each acre yielding 16 quarters of wheat at 35s. per quarter? Ans. £2,200.

11. (*Men only.*) A number consisting of three digits, which are in Arithmetical Progression, being divided by the sum of its digits gives a quotient of 48 ; and if 198 be subtracted from it, the digits would be inverted. Required the number. Ans. 432.

12. (*Men only.*) A rectangular bowling-green having been measured, it was observed that if it were 5ft. broader and 4ft. longer it would contain 116 square feet more, but if it were 4ft. broader and 5ft. longer it would contain 113ft. more. Required the length and breadth. Ans. 12 ft ; 9 ft.

13. (*Men only.*) If two circles touch one another internally, the straight line which joins their centres being produced, shall pass through the point of contact.

14. (*Men only.*) From a point T, two tangents are drawn to a circle whose centre is U, and T U meets the chord of contact at S. Show that the rectangle contained by the U S, U T, is = to the square on the radius.

15. (*Women only.*) Compare the cost, wear, and uses of cotton, linen, silk, and woollen fabrics.

16. (*Women only.*) Classify the several kinds of vegetable substances used as food. Take any three of such substances, describe their composition, and the way in which they serve to nourish the body.

17. (*Women only.*) Mark your initials in Cross Stitch.

18. (*Women only.*) Sew on a button and make a button-hole. Darn a hole, in the common method, on stocking material.

Second Week.

1. Give an extract from an Attendance Register for one week ; explain the marks employed, and show how the particulars required in the book of summaries should be obtained. Specify in detail the rules with regard to—
(*a*) Calculation of average attendance ;
(*b*) Removal from the registers, and re-admission ;
(*c*) Qualification of a scholar for entrance on the Examination Schedule.

2. What are the advantages respectively of written and oral examinations? Give a few simple rules such as would aid a Pupil Teacher or Assistant in forming a good style of questioning.

3. (*Women only.*) Narrate Johnson's Scotch experiences.

(*Men only.*) Who were *Tigranes, Macro, Æsop's damsel, Machiavel, Seneca, Narses*, and *Epimethus*?

4. Paraphrase Lines 335 to 343 of '*Passing of Arthur.*'

5. What do we mean by *centrifugal force, centripetal force, perihelion, solstice, mean solar day*, and the *Moon's nodes*?

6. Describe the Mahometan States of Africa.

7. Enumerate the historical circumstances connected with the following persons :—Peter the Hermit, Strongbow, Piers Gaveston, Wat Tyler, John Cabot, Thomas Cromwell, and John Hampden.

8. At what periods have epidemics devastated England?

(*Men only.*) What Ministers have been at the head of affairs from 1730 to 1819?

9. A bankrupt fails for £12,500, and his estate realises only £3,906 5s. 0d. What dividend does he pay, and what does a creditor receive whose claim is £798 10s. 0d.?
Ans. 6s. 3d. ; £249 10s. 7½d.

CERTIFICATE ROUTINE FOR **NOVEMBER**, 1891 (MEN AND WOMEN, SECOND YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	The Training of Pupil-teachers	Analyse (and Parse difficult words) of Lines 166 to 175 of Scene 2, Act V., 'King John'	Euclid, Book IV., *or* Print and Linen Patches	The Playground	Composition upon 'Nought shall make us rue, If England to herself do rest but true'	Euclid, Book VI., Props. 1 to 17; *or* Any Sewing	Notes of a Composition Lesson to Standard IV.	Paraphrase from Bacon's 36th Essay, *or* Revise the Essays	Euclid, Book II., *or* cut out on paper a Boy's Shirt and Child's Pinafore	Spencer *or* Locke	Composition upon 'The Greatest Servant is the Highest Lord'	Euclid, Book VI., Props. 1 to 17, *or* any Needlework
TUESDAY	History from 1815 to 1820	Cube Root *or* Square Root	As in First Year, *or* Geography of Central America	History from 1760 to 1787, *or* Revision of any Subject	Discount	As in First Year, *or* Geography of Quebec and Ontario	Descent of Victoria from William I.	Mental Arithmetic	As in First Year, *or* Geography of Manitoba and N.-W. Territories	Literature from 1789 to 1820	Theory of G.C.M. and L. C. M.	As in First Year, *or* Geography of Southern United States
WEDNESDAY	Any Revision	Surds, *or* Household Expenses	The Code requirements for the Standards in the Three R's	Interest and Annuities, *or* The Home: Its Water, Drainage, Soil, Aspect, and Ventilation	Any Revision	Study remainder of Bacon's Essays	Logarithms, *or* Penny Dinners for School Children	Mental Arithmetic	Revise any Algebra, *or* Domestic Economy	Any Revision	Theory of L. C. M. and G. C. M., *or* Domestic Economy as a Class Subject	As in First Year, *or* Geography of Western United States
THURSDAY	Important Laws from 1789 to 1820	Stocks	As in First Year, *or* Map of Gulf of St. Lawrence, including Cape Breton and Prince Edward Isles	Revision of Dates	Square Root, *or* Fuel and Fire-places	As in First Year, *or* Geography of Eastern United States	Civil Wars of England, *or* Inventions from 1789 to 1820	Miscellaneous Arithmetical Problems	As in First Year, *or* Map of British North America	Revise any History	Problems of Motion	As in First Year, *or* Revise Geography of British North America
FRIDAY	Binomial Theorem *or* Food for the Sick	Deductions upon Euclid, Book III., *or* Hedge-tears and Cross-cut (Diagonal) Darns	Paraphrase Lines 42 to 53 of Scene 1, Act V., 'King John'	Interest and Annuities, *or* Treatment of Skin Diseases	Deductions upon Euclid, Book VI., *or* Draw all the required Diagrams	Analyse (and Parse difficult words) of Lines 301 to 310 of 'Passing of Arthur,' *or* Lines 70 to 80 of Scene 7, Act V., of 'King John'	Permutations and Combinations, *or* Bodily Temperature, Cleanliness, and Exercise	Deductions upon Euclid, Book VI., *or* Describe the different methods of Darning	Study to end of 'King John'	Binomial Theorem, *or* Vaccination	Euclid, Book IV., *or* any Needlework	Paraphrase Lines 110 to 119 of Scene 7, Act V., of 'King John'

SATURDAY																
	Class Subjects	Repetition Penmanship, etc.	Music Intervals	Examination	Spencer or Locke	Repetition Penmanship, etc.	Music, Transposition from one time to another	Examination	Any School Management	Repetition Penmanship, etc.	Music, Simple and Compound Times, *or* Division of Pulses into Thirds and Quarters	Examination	Maintenance of Discipline	Repetition Penmanship, etc.	Music, Musical Rudiments	Examination

CERTIFICATE ROUTINE FOR NOVEMBER, 1891 (MEN AND WOMEN, FIRST YEAR).

DAYS	FIRST WEEK.			SECOND WEEK.			THIRD WEEK.			FOURTH WEEK.		
	I.	II.	III.	I.	II.	III.	I.	II.	III.	I.	II.	III.
MONDAY	Sequence of Intellectual Development	Read Bacon's Essays 29 to 32, 36, 38, 39, 50, *or* 'Johnson,' Chapter IV.	Euclid, Book III., Prop. 16 to 23, *or* Repairing Underclothing	The relative educational value of the subjects ordinarily taught	Language of Bacon, *or* 'Johnson,' Chapter VI.	Euclid, Book III., Prop. 24 to 30, *or* Diagram of an Infant's Shirt	The Influence of School Apparatus on the Intelligence	Analyse lines 1 to 8 of 'Passing of Arthur,' and Parse the Difficult Words	Euclid, Book III., Prop. 31 to 37, *or* Any Needlework	Moral Training	Analyse and Parse from Essay XIX., *or* Lines 65 to 74 of 'Passing of Arthur'	Euclid, Book II., *or* Questions on Needlework
TUESDAY	Chief Dates from 1624 to 1688	Mensuration of Triangles, *or* Practice	Physical Features of Africa	Chief Dates from 1688 to 1802	Revise any Proofs of Arithmetical Rules	Political Divisions of Africa	Scotch Affairs	Mensuration of Parallelograms, *or* The Simple Rules of Arithmetic	British South African Possessions	Chief Dates from 1802 to 1815	Mensuration of the Circle, *or* Division into Proportional Parts	Geography of Egypt, Nubia, and Abyssinia
WEDNESDAY	Any Algebraic Proofs, *or* Composition of Food	History from 1624 to 1688	Revise any School Management	The Algebraic Progressions, *or* Nutritive Value of Food	Problems on G.C.M. or L.C.M. *or* Compound Proportion	Study Grammar from Text Book	Problems in Quadratics, *or* Cleansing and Use of Clothing	Cube Root, *or* Compound Interest	Euclid, Book I., Prop. 27 to 48, *or* Diagram of a Pair of Drawers	Surds, *or* Ventilation	Problems on the Work of A, B, and C., etc.	Any Revision
THURSDAY	History from 1812 to 1820, *or* Revision	Mental Arithmetic	Physical Map of Africa	History from 1688 to 1802	Problems in Simple Equations, *or* Materials of Clothing	Rivers and Lakes of Africa	Irish Affairs	Simultaneous Quadratics, *or* Furnishing of the Home	Political Map of Africa	History from 1802 to 1815	The Algebraic Progressions, *or* Mastication and Digestion	Geography of the Barbary States and the Soudan
FRIDAY	Any Revision	Deductions of Euclid, Book III., *or* Diagram of a Pair of Drawers	Style of Bacon *or* 'Johnson,' Chapter V.	Industrial Condition of the People during Historical Period	Deductions of Euclid, Book III., *or* Diagram of a Woman's Chemise	Write an Essay on 'Speech is silver, but silence is gold'	Any Revision	Simultaneous Equations of one degree, *or* Functions of Food	Describe Tennyson's Conception of Arthur's Character, *or* Leslie Stephens' of Johnson	Any Revision	Any Revision	Write an Essay on 'Rolling stones gather no moss'
SATURDAY	Notes of a Geographical Lesson to Standard VI., *or* on 'Colour'	Repetition, Penmanship, etc.	Music, Accent and contents of Bars, *or* Continuations, Rests etc.	Examination	How to teach Composition, *or* Answering in Infant Schools	Repetition, Penmanship, etc.	Music, Transposition from one time to another	Examination	Training of the Memory	Repetition, Penmanship, etc.	Music, Musical Terms	Examination	Notes of a Lesson on 'The beaks of birds'	Repetition, Penmanship, etc.	Music, Musical Rudiments	Examination

10. A man sails from England on the 1st January, 1881, leaving a sum of money at his banker's at 3½ per cent. simple interest. On the 1st of July, 1885, he returns and finds £549 16s. 3d. is the amount standing to his credit. How much of this sum is interest, and how much is principal? Ans. £475; £74 16s. 3d.

(*Men only.*) Find the loss or gain in capital and in income which would arise from transferring £10,000 in the Three per Cents. at 101¼ to the Two and a Half per Cents. at 108.

Ans. £625 loss; £65 12s. 6d. loss.

11. (*Men only.*) Find two numbers in the proportion of 5 to 7, to which two other required numbers in the proportion of 3 to 5 being respectively added, their sums shall be in the proportion of 9 to 13; and the difference of these sums = 16. Ans. 30, 42, 6, 10.

12. (*Men only.*) The difference between the first and second of four numbers in geometrical progression is 36, and the difference between the third and fourth is 4. What are the numbers?

Ans. 54, 18, 6, 2.

13. (*Men only.*) Construct a square equal to a given rectangular figure.

14. (*Men only.*) If from a point outside a circle two straight lines be drawn, one meeting and the other cutting the circle, and if the square on the line meeting the circle be equal to the rectangle contained by the whole of the line cutting the circle and the part without the circle, then the former line shall be a tangent.

15. (*Women only.*) Why must food be masticated and what is understood by inability to digest food?

16. (*Women only.*) Give a list of all the articles to be found in a well-provided laundry, and name the various prices of the substances used in washing. Mention also what precautions must be observed in using these substances.

17. (*Women only.*) Write Notes of a first lesson on Cutting-out.

18. (*Women only.*) Draw a diagram on sectional paper of an infant's shirt.

Third Week.

1. State in detail the subjects required by the Code for the Third Standard in Elementary and in Class Subjects. Say how much time a week should be devoted to each.

2. To what extent is it desirable to employ 'Home Lessons' as an adjunct to school-work? Say for what subjects and for what classes of scholars they are best suited; and how much time it is reasonable to require for their preparation.

3. (*Women only.*) Give the derivations of *catalogue*, *economy*, *culminating*, *antithetic*, *bishop*, *plausibility*, *eccentricity*, and *polite*.

(*Men only.*) What are the meanings of the following words in 'Bacon':—*provoketh*, *desperate*, *bravery*, *stirps*, *Calendars*, *convince*, *schoolmen*, and *card*?

4. Analyse Lines 139 to 146 of '*Passing of Arthur*,' and parse the following words:—*that*, *whereon*, *beats*, *dead*, *as*, *tho'*, *Bedivere*, *confusion*, *till*, *what*, *whence*, *whether*, *behold*, *but*, *king*.

5. What are the effects upon Climate of *Slope of surface*, *Forests*, *Proximity to Sea*, *Elevation*, and *Situation in high latitudes*?

6. Draw a Map of the Western Coast of Africa.

7. Mention the 'Favourites' who have influenced our monarchs from 1066 to 1815.

8. What are the steps in the progress towards Electoral Freedom achieved from 1689 to 1815?

(*Men only.*) Give the principal articles of the Treaty of Amiens.

9. The capital of a railway is £5,000,000. The average quarterly income is £222,892 13s. 4d., and the average weekly expenditure £12,818 13s. 4d. At what rate per cent. is the dividend paid to the shareholders? Ans. 4¼ per cent.

10. An examiner wishes to mark three questions in the proportion of the numbers 2, 3·2, and 4·8. The sum of the marks is to be 150. How must he distribute them? Ans. 30, 48, 72.

(*Men only.*) In what proportion must teas worth 2s. 3d. and 3s. 0d. per lb. be mixed, to give a mixture worth 2s. 8d. per lb.

Ans. 4 lbs. at 2s. 3d.; and 5 lbs. at 3s. 0d.

11. (*Men only.*) From two towns, which were 168 miles distant, A and B set out to meet each other. A went 3 miles the first day, 5 the next, 7 the third, and so on. B went 4 miles the first day, 6 the next day, and so on. In how many days did they meet?

Ans. 8 days.

12. (*Men only.*) A merchant finds that if he mixes sherry and brandy in quantities which are in the proportion of 2 to 1, he can sell the mixture at 78s. a doz., but if the proportion be as 7 to 2, he must sell it at 79s. per doz. Required the price of each liquor.

Ans. 81s., and 72s.

13. (*Men only.*) If a straight line drawn through the centre of a circle bisect a straight line in it which does not pass through the centre, it shall cut it at right angles; and if it cut it at right angles it shall bisect it.

14. (*Men only.*) Draw through one of the points of section of two intersecting circles a straight line terminating in the circumferences and bisected at that point.

15. (*Women only.*) Name the chief considerations, under the heads Foundation, Site, Light and Drainage, which ought to be kept in view in building a house.

16. (*Women only.*) Give, naming the exact proportions, the constituents of atmospheric air, and explain the separate use of each of them.

17. (*Women only.*) Draw a diagram on sectional paper of a woman's chemise.

18. (*Women only.*) Enumerate the different stitches employed in making the chemise, and describe two of them.

Fourth Week.

1. Write notes of a lesson on one of these subjects, and say for what class of children your lesson will be adapted.

2. What is meant by the statement that 'In the growth of the intellectual powers, one of them is often developed sooner than the other'? Give some examples, and say what practical inferences they suggest to the teacher.

3. (*Women only.*) Write out the substance of Johnson's letter to Chesterfield.

(*Men only.*) Write out the substance of Bacon's remarks on 'Seeming Wise.'

4. What classes of words in our language perform double functions?

5. How does Climate determine the occupation of the inhabitants of the Philippine Islands, the Southern States of America, Greenland, Dahomey, and Greece?

6. Describe the courses of the Zambesi and the Niger.

7. Arrange the reigns of our sovereigns between 1066 and 1815 in order of duration.

8. Enumerate (with dates if possible) our chief land battles fought outside Europe from 1750 to 1800.

(*Men only.*) Briefly narrate the career of Napoleon.

9. Divide £2 12s. among 5 men 7 women and 14 boys, so that each woman may have ¾ of each man's share, and each boy ¾ of each woman's share. Ans. Men, £1 5s. 0d.; Women, 15s. 0d.; Boys, 12s. 0d.

10. Find and state in £ s. d. the value of 5·03125 of £1 6s. 8d. *minus* 6·05¼ of 11s. 5½d. Ans. £4 19s. 2d.

(*Men only.*) Simply $2\cdot\dot{0}\dot{9}\times1\cdot\dot{1}\dot{3}\dot{5}\times1\cdot\dot{3}\dot{7}\dot{0}\times2\cdot\dot{0}\dot{7}692\dot{3}\times1\cdot\dot{5}\dot{7}1428$.

Ans. $10\frac{8}{13}$.

11. (*Men only.*) Some smugglers discovered a cave, which would exactly hold the cargo of their boat, viz., 13 bales of cotton and 33 casks of rum. Whilst they were unloading, a custom house cutter coming in site they sailed away with 9 casks and 5 bales, leaving the cave two-thirds full. How many bales or casks would it hold?

Ans. 24 bales, 72 casks.

12. (*Men only.*) There are four numbers in Arithmetical Progression whose sum is 28, and their continual product is 585. Required the numbers. Ans. 1, 5, 9, 13.

13. (*Men only.*) Explain the terms *axiom* and *postulate*. Write out the 12th axiom. What axioms have been proposed in its place?

14. (*Men only.*) Construct a right-angled triangle, having given one side, and the sum of the other and the hypotenuse.

15. (*Women only.*) Give reasons in favour of a mixed diet.

16. (*Women only.*) What are condiments? Name four of those in most general use.

17. (*Women only.*) Specify and describe as to an upper class of children the different parts of a skirt. Explain the quantity of material required to make one, and the manner in which it should be cut out.

18. (*Women only.*) Let in a calico patch (3×3 ins.)

QUESTIONS FOR SECOND YEAR.

First Week.

1. At what period in the day's routine should the class registers be marked and finally closed? Describe fully the authorised way of marking and of testing the accuracy of the registers.

2. What does Herbert Spencer say of Pestalozzi? *or* What are the different contrivances proposed by Locke in order to teach Reading?

3. Paraphrase the following:—

'O what a noble combat hast thou fought
Between compulsion and a brave respect!
Let me wipe off this honourable dew,
That silverly doth progress on thy cheeks:
My heart hath melted at a lady's tears
Being an ordinary inundation;
But this effusion of such manly drops,
This shower, blown up by tempest of the soul,
Startles mine eyes, and makes me more amazed
Than had I seen the vaulty top of heaven
Figured quite o'er with burning meteors.'

4. Explain the following passages:—*globe of precepts; consultations are more indifferent; Hinc usura vorax, rapidumque in tempore fœnus; the fables in the Legend;* and *adamant of acquaintance.*

5. } (*Men only.*) As in First Year.
6. }

7. (*Women only.*) Name the principal rivers that flow into Hudson Bay and the Gulf of Mexico.

8. (*Women only.*) Enumerate with their capitals the Cotton States and Pacific States of the United States.

9. (*Men only.*) See Question 7 of First Year.

10. (*Men only.*) „ „ 8 „

11. Who wrote the following works:—*Curse of Kehama, English Bards and Scotch Reviewers, History of Charles V., Evidences of Christianity, Natural History of Selborne,* and *American Ornithology.*

12. Give dates of *Capture of Cape of Good Hope, Capture of Malta, Battle of Assaye, Battle of Trafalgar, Convention of Cintra, Battle of Vittoria,* and *Bombardment of Algiers.*

13. (*Men only.*) If n is any positive integer, find the value of

$$n^{n+3} - n(n-1)^{n+3} + \frac{n(n-1)}{1\times 2}(n-2)^{n+3} - \ldots\ldots$$

Ans. $\lfloor n+3 \left\{ \frac{n}{24} + \frac{n(n-1)}{12} + \frac{n(n-1)(n-2)}{48} \right\}$

14. (*Men only.*) Find the number of ways in which a substance of a ton weight may be weighed by weights of 9 lbs. and 14 lbs. *Hints.*—The solutions are found from 14t. weights of 9 lbs. and 160-9t. weights of 14 lbs.

15. (*Men only.*) To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts shall be equal to the square of the other part. Show that the squares on the whole line and on the smaller part are equal to three times the square on the smaller part.

16. (*Men only.*) To describe a circle about a given regular pentagon. If the pentagon be PQRST, show that PR is parallel to ST.

17. (*Men only.*) Simplify $\sqrt{\left\{(1\tfrac{1}{4}+2\tfrac{3}{4}) \times \frac{5\tfrac{1}{16}}{4\tfrac{3}{4}+\tfrac{3}{4}}\right\}} \div \tfrac{3}{4}$

Ans. 2·309+

18. (*Men only.*) Find the value of $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} - \frac{\sqrt{5}-\sqrt{3}}{\sqrt{5}+\sqrt{3}}$ to three places of decimals.

Ans. 7·745.

19. (*Women only.*) The discount of a certain sum of money due 5 years hence is £20, and the interest on the same sum for the same time is £25. Find the sum and the rate per cent. per annum.

Ans. £100; 5 p. c.

20. (*Women only.*) The quotient of a division sum is 515,450, and the divisor is to the quotient as 9 is to 65. Find the dividend?

Ans. 36,787,666,500.

21. (*Women only.*) What difference should be made in the way of stewing meat which is meant to be eaten as distinguished from meat intended to make soup? Give your reasons.

22. (*Women only.*) If you allot four hours a week to the teaching of needlework to girls, say how the time is best distributed; whether in four separate lessons of an hour each, or two of two hours each, or otherwise. Say what plan you intend to adopt, and why.

Second Week.

1. How would you find the average attendance of a class, and of the whole school, both for the school year, and for any week in the year?

2. What are the steps by which Locke would teach Latin to a child? *or* What does Herbert Spencer say about 'that intensely stupid custom, the teaching of Grammar to children?'

3. Explain the following phrases or allusions:—*white-faced shore, a calf's skin, airy devil, five moons, wall-eyed,* and *these flats.*

4. What do you know of *Friar Clement, Lepanto, Themistocles, Heraclitus, Castoreum* and *Briareus?*

5. } (*Men only.*) As in First Year.
6. }

7. (*Women only.*) Enumerate with capitals the Mississippi States and the States bordering upon Canada.

8. (*Women only.*) Draw a map of Novia Scotia and New Brunswick.

9. (*Men only.*) See Question 7 of First Year.

10. (*Men only.*) See Question 8 of First Year.

11. Give instances of the Suppression of the Habeas Corpus Act in Great Britain from 1794 to 1802.

12. What mutinies took place between 1789 and 1820?

13. (*Men only.*) Given $\log_{10} 2 = \cdot 30103$ find $\log_{10} 50$.

Ans. 1·21534.

14. (*Men only.*) Show that the sum of the first n natural numbers taken 2 and 2 together $= \frac{(n-1)\,n\,(n+1)\,(3n+2)}{24}$.

15. (*Men only.*) The opposite sides and angles of a parallelogram are equal to one another, and the diameter bisects it, that is, divides it into two equal parts.

16. (*Men only.*) From a point P outside a circle, a line is drawn cutting the circle at Q and R. Find a mean proportional between PQ and PR.

17. (*Men only.*) If the velocity of sound be 1,100 ft. per second, and that of a cannon ball 1,000 ft. per second, calculate the distance from the gun of a spot where the report is heard three-fourths of a second before the shot strikes it. Ans. 8,250 ft.

18. (*Men only.*) Find the length of the edge of a cube which contains 450 ft. 1,088 cubic ins. Ans. 7 ft. 8 ins.

19. (*Women only.*) A cubic inch of water weighs 252·5 grains, and a gallon contains 277·274 cubic ins. Express in tons and decimals of a ton the weight of 1,000 gallons of water.

Ans. 4·465 + tens.

20. (*Women only.*) A person left £100 for ever to a school. What sum must have been invested in the Three per Cents. at 93¼ to yield this amount? Ans. £2,666 13s. 4d.

21. (*Women only.*) For a sound system of house drainage attention must be especially directed to (*a*) disconnection; (*b*) ventilation; (*c*) trapping. Explain, *using simple diagrams,* the importance of these points.

22. (*Women only.*) Should a case of scarlet fever occur, what steps should be taken to prevent the spread of it? (1) To the other members of the family; (2) to the neighbouring inhabitants; and (3) to the succeeding tenants.

Third Week.

1. Give rules with regard to:—
   (1) Removal of a scholar's name from the register.
   (2) Leaving school before the expiration of the legal period.
   (3) Responsibility of School Managers for the accuracy of the registers.
   (4) Admissions and re-admissions.

2. What do you understand by a perfect Definition? What processes of thought are employed in arriving at one? Give two or three examples that err by being either too wide or too narrow.

3. What anachronisms occur in 'King John'?

4. Give a synopsis of Bacon's Essay on 'Ambition.'

5. } (*Men only.*) As in First Year.
6. }

7. (*Women only.*) What States are the most arid, the most populous, the most wooded, the most abounding in minerals?

8. (*Women only.*) Name a town upon each of these rivers:—Merrimac, Arkansas, Hudson, Colorado, Delaware, Susquehanna, Alabama, and Sacramento.

9. (*Men only.*) See Question 7 of First Year.

10. (*Men only.*) See Question 8 of First Year.

11. Give the approximate dates of *Invention of Steam Engine, Invention of the Power Loom, Founding of Royal Institution, Founding of National School Society, Construction of Bell Rock Lighthouse*, and *Bank Restriction Act.*

12. What do you know of Joseph Wedgwood, Arkwright, and the Luddites?

13. (*Men only.*) Find the sum of the reciprocals of n terms in a geometrical progression, of which the first term is a and the common ratio r.

Ans. $\frac{1-r^n}{ar^{n-1}(1-r)}$

14. (*Men only.*) Solve $\frac{x}{y}+\frac{y}{x}=\frac{5}{2}$; $xy=8$.

Ans. $x=\pm 2$ and ± 4; $y=\pm 4$ or ± 2.

15. (*Men only.*) If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the two sides of one of them greater than the angle contained by the two sides equal to them of the other, the base of that which has the greater angle shall be greater than the base of the other.

16. (*Men only.*) P and Q are fixed points on a given circle; PR, QS are any pair of chords equally inclined to PQ. Show that the direction of RS is fixed.

17. (*Men only.*) A rectangular block whose length is twice its breadth contains 2,420 acres. Find the expense of placing a fence around it at 16s. per chain. Ans. £528.

18. (*Men only.*) The circumference of the base of an upright cone being 44 ft. and the slant height 10 ft., find the area of the convex surface. Ans. 220 sq. ft.

19. (*Women only.*) A tradesman sells an article for £12, thereby losing 4 per cent. He recovers his loss by selling another article for £8. Find his gain per cent. on the second article.

Ans. 6⅔ per cent.

20. (*Women only.*) Extract the square root of ·00998001.

Ans. ·0999.

21. (*Women only.*) What are the advantages or disadvantages of Clothing Clubs, Shoe Clubs, or other similar contrivances for saving in a school, and how do they compare in usefulness with the ordinary Post Office Savings Bank?

22. (*Women only.*) Give a recipe for making barley-water, and say when, and in what sort of illnesses, it is most useful.

Fourth Week.

1. Give the Rules of the 'Assisted Education Act' as regards the maximum fee chargeable and the mode of calculating and paying the Fee Grant.

2. What is meant by '*Convertible Terms*'? State in what sort of propositions the terms are convertible, and in what they are not convertible, and give some illustrations.

3. 'Nay, it is in a manner done already,
For many carriages he hath dispatched
To the seaside, and put his cause and quarrel
To the disposing of the Cardinal,
With whom, yourself, myself, and other lords,
If you think meet, this afternoon will post
To consummate this business happily.'

Analyse the above passage, and parse the italicised words.

4. Write a short essay upon '*The merchants are the vena porta.*'

5. } (*Men only.*) As in First Year.
6. }

7. (*Women only.*) Draw a map of the Pacific Coast of Canada.

8. (*Women only.*) Name the chief stations on the Canadian Pacific Railway.

9. (*Men only.*) See Question 7 of First Year.

10. (*Men only.*) See Question 8 of First Year.

11. State what you know of the *Berlin Decrees.*

12. Give the chief provisions of the Treaty of Paris (1814).

13. (*Men only.*) Show that x^n-1 is greater than $n\left(x^{\frac{n+1}{2}}-x^{\frac{n-1}{2}}\right)$ if n is any positive integer, and x any positive quantity greater than unity.

14. (*Men only.*) Show that $n^5-4n^3+5n^2-2n$ is divisible by 12 for all values of n greater than 2.

15. (*Men only.*) If a straight line drawn through the centre of a circle bisect a straight line in it which does not pass through the centre, it shall cut it at right angles.

PQ, SR are two equal chords of a circle of which O is the centre. Prove that the line joining O to the point of intersection of these chords bisects the angle between them.

16. (*Men only.*) To describe a circle about a given triangle.

If two circles be described, one about, the other within a right-angled triangle, the sum of their diameters is equal to the sum of the sides containing the right angle.

17. (*Men only.*) A stone dropped down a shaft falls through a number of feet equal to 16·1 times the square of the number of seconds during which it is falling. After how many seconds would the stone reach the bottom of a pit 6,766·025 ft. deep.

Ans. 20·5 seconds.

18. (*Men only.*) What is the area of a walk 10 ft. wide which surrounds a circular lawn 14 yds. across?

Ans. 181 sq. yds. 5¾ ft.

19. (*Women only.*) Find the present worth of £1,000 due 100 days hence at 10 per cent. per annum. Ans. £973 6s. 8d.

20. (*Women only.*) How many yards of matting 2·4 ft. broad will cover a floor 27·3 ft. long and 20·16 ft. broad? Ans. 75½ yds.

21. (*Women only.*) Describe the best means of preparing, boiling, and serving up a dish of potatoes.

22. (*Women only.*) Show how the possession of a garden attached to a working-man's cottage may be turned to the best account. (*a*) In providing for home consumption. (*b*) In selling the produce.

CORRESPONDENCE.

We shall be pleased to reply briefly and through this column to any seeking information and advice.

Replies demanding urgency will be promptly forwarded per post on receipt of stamped and addressed envelope. A post will be saved by writing direct to Dr. George Beach, M.A., Stanley Mount, Macclesfield.

This privilege does not of course extend to furnishing the solutions and answers for problems.

Disgusted (Whitehaven).—Your predecessor has a just claim to five-sixths of the Grant.

Will (Hollis St., Dublin).—Glad to hear of your prospects. Your proposed course is a wise one.

Den (Bury).—The Department of Science and Art will allow you to sit at the School Examination.

Plet (Yarmouth).—You may retain on your register any scholar over 14 who has not passed the Seventh Standard.

R. S. G. (Ayton).—1. We are very much obliged for the corrections. 2. The company is probably liquidating, but we are not sure.

Canny (Sheffield).—Our space will not permit repetition, but procure the July Number.

Orangeman (Tewkesbury).—See the Infinitive Mood. You will find the construction fully dealt with.

Perplexed (Malvern).—You may collect weekly subscriptions from the scholars, in addition to the balance of the school pence, but such sums must be duly entered in a separate book in the name of the Treasurer, and the parents must thoroughly understand the proceeding.

Paris (Durham).—See answer to 'Den' above.

J. N. (Taunton).—We know of no such work. Apply to the nearest educational agency.

O. L. P. (Dalkeith).—Overend's Physiology, published by Hughes and Co.

D. K. (Hereford).—The books have been forwarded. Do they suit?

Hopeful (Nantwich).—You are quite welcome; go on to the London Matriculation.

Ripon (Rugby).—Apply to the N. U. T. officials. Terms will be easy.

T. G. (Newport).—Out of the frying-pan into the fire! The candidates are legion.

Z. (Thetford).—Newman and Co.

Hopeful (2) (Rugeley).—Fully explained this month.

T. B. (Gomersal).—Dunstan's Music Manual, Allen and Co., 3s. 6d.; Gladman's School Management, Jarrold and Son, 2s. 6d.; Halford Hawkins' Art of Reading, Hughes and Co., 6d.; Stor-

month's Dictionary, W. Blackwood and Son, 7s. 6d.; Professor Darqué's French Course, Hughes and Co., 2s.; Medium pointed pens.

H. G. (Beeston).—We are much obliged for your kind acknowledgment.

ANSWERED PER ORDINARY LETTER.

R. W. D. (Hillingdon), W. K. (Berwick), S. S. (Stockport), J. M. (Bournemouth), L. U. (Edgbaston), THOROUGH (Walsall), L. G. T. (Caterham), J. M. (Old Trafford), P. W. A. (Tranmere), J. J. (Holyhead), J. V. S. (Garston), M. P. (Crewe), W. S. (Wednesbury), E. J. G. (two letters) (Saundersfoot), K. H. (Edinburgh), A. K. (Dundee), P. S. P. (Sandhaven), T. J. (Colchester), P. R. (Whaley Bridge), M. A. (Halesowen), R. R. (Chester Training College), P. H. (Rotherham), B. L. (Hastings), U. B. (Stoke), T. O. M. (Colchester), W. S. (East Brent), N. C. E. (Westminster), B. R. W. (Oxford Road), A. W. (Arbroath), E. B. (Cauldon Lowe), M. J. K. (Portencross), J. T. P. (Drefach), H. L. (two letters) (Barnsley), E. H. C. (Plumstead), E. A. N. (Woolsthorpe), T. C. H. (Wallingford), H. R. (Bishop's Nympton), T. S. H. (Barrow), R. R. W. (Clydach Vale), E. J. G. (Hexthorpe), A. F. P. (Attleborough), E. M. (Gainsboro' Grove), T. B. (Sowerby Bridge), E. J. (Falmouth).

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LONDON MATRICULATION.

JANUARY, 1892.

OUR PREPARATION CLASS FOR PRIVATE STUDENTS.

BY T. RUSSELL MALTBY, M.A. (CLASSICAL HONOURS),
Kingswood School, Bath.

(FIFTH MONTH.)

I. LATIN.

Notes on September and October Work.

Allen's Grammar, Sects. 154 to 229.

(1) The Rules of Gender according to *meaning* (154) take precedence of all others, and must be constantly borne in mind. Generally speaking they may be applied fearlessly, *e.g.*, *Jura* (m.), *Trebia (the river)* (m.), *Cyprus* (f.), *Corinthus* (f.), *mālus, apple-tree* (f.)

(2) Exceptions—*Styx* (f.), *Lethe* (f.), *calamus, reed* (m.), and a few other names of plants.

(3) Sect. 154 (*b.*) When the sex is to be clearly distinguished *mas* or *femina* is used: *bos femina, a heifer.*

(4) *Optio* (f.) means *choice.*

(5) All words in *-or, -oris* are masc., except *soror, sister*, and *uxor, wife.*

(6) The fractions of the *as* are given on p. 143. Of course *uncia* ($\frac{1}{12}$) is fem. Note the genitives *semissis* and *bessis.*

(7) An easy mnemonic for the neuter terminations of the third declension is, *lancet, are you sure?* (*l, a, n, c, e, t, ar, us, ur*).

(8) Note the difference in gender and stem between *pecus, beast*, and *pecus, herd.*

(9) Except in monosyllables, *-us* of third declension is generally a fem. termination.

(10) To the feminines of fourth declension add (by 154) *socrus, mother-in-law, nurus, daughter-in-law, anus, old woman.*

(11) *Dies* is usually masc.; fem. in sing. only, and then generally denotes *a period of time.*

(12) Sect. 156. First Declension. The genitive *familias* is found with *pater, mater, filius, filia.* In the plur. we find both *patres familias* and *patres familiarum.*

(13) The locative endings of the first declension are, sing. *-æ*, plur. *-is.*

(14) The *locative* endings of the second declension are, sing. *-i*, plur. *-is.*

(15) Learn again the list of nouns declined like *puer;* the following (commonly found) are like *magister* (dropping the *e*), *ager, aper, arbiter, auster, cancer, caper, coluber, culter, faber, liber* (but not *lĭber*), *minister.*

(16) Decline in parallel columns, marking all the quantities, *vir, virus, vis.*

(17) Revise the notes on Sect. 16. The rules apply only to nouns *substantive.* Adjectives in *-ius* make voc. masc. in *-ie*, gen. masc. and neut. in *-ii.*

(18) Learn with declension of *deus* the voc. masc. of *meus* (*mi.*). Distinguish three words spelled *dis.*

(19) The *locative* endings of the third declension are sing. *-i*, plur. *-ibus.*

(20) From Sect. 158 and the following notes candidates may make their noun-lists (see *P.T.* for September) fairly complete. They will also find here good practice in determining genders:—

-a, -ătis: Greek neuter nouns like *poema* often have dat. and abl. plur. in *-is.*

-l, -lis: as a rule, but *mel* and *fel* make *-llis.*

-ēn, -ēnis: ren, splen.

-ēn, -ĕnis: Hymen.

-ĕn, -ĭnis: as a rule.

-ō, -ōnis: about seventy nouns like *latro*, with many family names, as *Cicero.* *-iō* always has gen. *-iōnis.*

-ō, -ĭnis: Apollo, homo, nemo, turbo, and all in *-do* and *-go. Caro, carnis* for *carinis.*

-ăr, -āris: like *calcar* are *laquear* and neuters in *-ar*, originally adjectives.

-ăr, -ăris: baccar, jubar, lar, nectar, salar.

-ĕr, -ris: imber, linter, uter, venter, accipiter, pater, mater, frater.

-ĕr, -ĕris (mostly Greek): *crater, halter, ver.*

-ĕr, -ĕris: aer, æther.

-ĕr, -ĕris: like *carcer*, about twenty-five nouns, including *agger, ānser, lacer, passer, vesper, vōmer* (all masc.); *mulier* (f.); *ăcer, cadāver, tūber, tŭber, uber, verber* (all neut.)

-ŏr (*-ōs*), *-ōris:* about seventy nouns, besides many denoting the agent.

-ŏr, -ŏris: like arbor (f.), *æquor* (n.), *marmor* (n.), and a few others.

-ūr, -ūris: fur only.

-ŭr, -ŭris: nine like *vultur* (m.); *fulgur, guttur, murmur, sulfur* (n.)

-ŭr, -ŏris: like *robur, ebur, femur, jecur.*

-ūs, -ūdis: some Greek nouns (f.) and *vas* (m.)

-ūs, -ūtis: about twenty masc. nouns, and many abstract nouns in *-tas, -tatis.*

-ēs, -is: about forty nouns like *nubes.*

-ēs, -ĕris: Ceres (f.)

-ēs, -ēdis: cupes, heres, merces, præs.

-ēs, -ĕdis: compes, pes, quadrupes.

-ēs, -ĭdis: obses, præses.

-ēs, -ētis: lebes, magnes, quies, inquies, requies.

-ēs, -ĕtis: abies, aries, paries.

-ĕs, -ĕtis: interpres, seges, teges.

-ĕs, -ĭtis: about twenty nouns like *miles.*

-is, -is: about a hundred nouns like *avis*

-is, -ĕris: cinis, cucumis, pulvis, vomis

-ōs, -ōris: flos, glos, mos, os, ros.

-ōs, -ōdis: custos.

-ōs, -ōtis: cos, dos, nepos, sacerdos.

-ŭs, -ĕris: twenty neuters like *opus*, and *Venus* (f.)

-ŭs, -ŏris : fourteen neuters like *corpus*, and *lepus* (m.)

-ūs, -ūris : crus, jus, mus, pus, rus, tellus, tus.

-ūs, -ūtis : iuventus, salus, senectus, servitus, virtus.

-ūs, -ūdis : fraus, incus, laus, palus, pecŭs (pecŭdis), subscus.

-ns, -ndis : frons, glans, inglans.

-ns, -ntis : besides participles used as nouns, about twenty like *mons.*

-ax, -ācis : fax, anthrax, and a few rare nouns.

-ax, -ācis : pax, thorax, and a few rare nouns.

-ex, -ĕcis : alex, vervex.

-ex, -ĭcis : about forty nouns like *pollex.*

-ix, -ĭcis : appendix, salix, and a few rare nouns.

-ix, -ĭcis : many in *-trix* (fem. of *-tor*), and about thirty nouns like *radix.*

-ox, -ōcis : celox and *vox.*

-ux, -ūcis : crux, dux, nux.

-ux, -ūcis : balux, lux.

-x, -cis : arx, calx (two words), *calyx, falx, lynx, merx.*

-x, -gis : coniux, frux, grex, lex, phalanx, rex, Styx, and a few rare names of animals.

Note the following: *grus, gruis ; sus, suis ; heros, herois ; bos, bovis ; Anio, Aniēnis ; delphin, delphīnis ; sanguis, sanguĭnis ; senex, senis ; æs, æris ; far, farris ; iter, itineris ; jecur, jecinoris*, as well as *jecoris ; glis, glīris ; anŭs, anŭtis ; as, assis ; lis, lĭtis ; nex, nĕcis ; remex, remigis ; nox, noctis ; puls, pultis ; caput, capitis ; cor, cordis ; hepar, hepatis ; ŏs, ossis ; vās, vāsis ; lac, lactis ; nix, nivis ; supellex, supellectilis.*

(21) Sect. 158 (*b*). Adjectives used as nouns, like *annalis*, take ablative in *-i*.

(22) Sect. 158 (*g*) A. Add the following genitives in *-um* (not *-ium*) : *ambagum, sēdum.*

(23)

Nom.	*domus*	*domūs*
Voc.	*domus*	*domūs*
Acc.	*domum*	*domos* (*domūs*)
Gen.	*domūs*	*domorum, domuum*
Dat.	*domui* (*domo*)	*domibus*
Abl.	*domo* (*domu*)	*domibus*
Loc.	*domi* (*domui*)	

(24) Revise the lists of adjectives declined like *tener*, and like *acer.*

(25) Look up the stems of the adjectives in Sect. 161 (*b*), also of *anceps, perpes, præceps, prapes, pubes.*

(26) Sect. 163 (*c*). The plurals *freni* and *frena* mean *bridle.* Add *delicium, pleasure*, pl. *delicæ, pet.*

(27) 164 (*l*). See Dictionary for the differing meanings of the sing. and plur. of *aqua, bonum, comitium, fides, fortuna, hortus, natalis, pars, plāga, rostrum.*

(28) *Pronouns.*—To all cases of the personal and reflexive pronouns (except the nominative of *tu*) *-met* may be added for emphasis. For *tu* use *tute* or *tutimet.* The possessives often have in the ablative case *-met*, or *-pte. Ægomet, suosmet, suamet.* The tables of pronouns (167) with meanings should be thoroughly learnt. Take abundant practice in writing *dates* in Latin.

De Bello Gallico, V. 20 to the end.

(1) Account for the indicatives *munierunt* (c. 21), *curaverat* (c. 23), *cognoverat* (c. 25), *excesserat* (c. 35).

(2) Have notes ready on *milibus passuum centum continebantur* (c. 24), *primum pilum duxerat* (c. 35), *sui liberandi* (c. 38).

(3) Turn into *oratio recta* the speeches of cc. 27 and 28, and into *oratio obliqua* that of c. 30.

(4) What are Cæsar's expressions for 'to give in,' 'to form in a circle,' 'to catch fire'?

(5) What are the meanings of *contabulantur, pinnæ loricæque, falces, ferventes fusili ex argilla glandes, amentum, opinione triūm legionum delectus, timoris opinionem.*

(6) Distinguish the two verbs *appello* (1st and 3rd).

Latin Course for November.

1. *Allen's Grammar, Sects. 230-294, Examples.*—Copulative Verbs and Apposition, Time, Place, and Measure, Accusative, Dative, Ablative, Genitive, Impersonals, Infinitive, Gerund and Gerundive, *Qui, Quum*, and *Ut, Se* and *Suus, Utrum, Num, -Ne*, and *An.*

2. *Allcroft and Haydon, Sects. 212-247.*

3. *Allcroft and Haydon, Exercises XII., XIII., XIV., and XV.* 90 sentences.

4. *De Bello Gallico, VI., cc. 1-28.*—Write out a careful translation ; cc. 1-13 were done rapidly in the August course.

5. *Translation at Sight.*—Continued practice.

II. GREEK.

Notes on September and October Work.

Abbott and Mansfield, Sects. 122-165.

(1) Under 'the Augment,' note these Homeric forms: (*a*) a reduplicated strong aorist (in all the moods), active and middle, πέπιθον (πείθω), τεταρπόμην (τέρπω) ; (*b*) the occasional doubling of other letters (especially λ) as well as ῥ, ἔλλαχον, ἐσσείοντο.

(2) Five verbs have ει instead of reduplication—λαγχάνω, λαμβάνω, λέγω, μείρομαι, and stem of εἴρω (εἴρηκα, &c.).

(3) Observe the note in Sect. 138 on πέπραγα (intransitive) and πέπραχα (transitive). Learn the transitive and the intransitive tenses of ἵστημι, Sect. 151.

(4) Write out the conjugations of εἰμί, εἶμι, φημί, οἶδα, from memory, once a week.

Greek Course for November.

1. *Abbott and Mansfield's Grammar, Sects. 166-168* (Principal Parts. Words differing in meaning according to their accent).—Those who have time should begin *Abbott and Mansfield's Syntax*, published with the Accidence, and also in separate form at 1s. 6d. Learn Sects. 1-32, with the examples.

2. Revise Merry's Sketch of Homeric Forms.

3. *Odyssey IV., 492-631.*—Write out a translation of your own after full study of the text, the lexicon, and other helps.

4. *Translation at Sight.*—Continued practice.

FRENCH.

Notes on September and October Work.

Breymann : Strong Verbs, Articles, Nouns.

(1) Add to the list of irregular Futures *enverrai* (from *envoyer*), and to the list of irregular third plurals *vont* (from *aller*).

(2) Learn the Imperative of *s'en aller* thus :—*va-t-en, qu'il s'en aille, allons-nous-en, allez-vous-en, qu'ils s'en aillent ;* and negatively, *ne t'en va pas, qu'il ne s'en aille pas*, &c.

(3) Note the accents in the conjugation of *acquérir.*

(4) The past participle *dû* takes no circumflex in the feminine *due.*

(5) *Confire* is used chiefly in the Infinitive, with *faire : j'ai fait confire*, &c.

(6) *The Article.* Distinguish *un palais de roi*, and *un palais du roi ; eau de mer*, and *eau de la mer*, &c.

(7) When is the definite article invariable?

(8) In the work on the articles the examples are important.

(9) *Gender of Nouns.* The following mnemonics have appeared in *The University Correspondent* —

I. Males all that end in B, C, D,
G, H, K, L, Q, Y, Z, P.

II. *B*efore *C*ool *D*iligence *G*o, *H*urrier, *K*neel,
*L*et *P*erseverance *Q*ualify *Y*our *Z*eal.

III. Every noun *not* ending in one of the letters *f, a, m, i, n, e; r, u, s, t; g, o* is masculine.

(10) In the Additional Remarks on the Gender of Nouns note the examples.

French Course for November.

1. *Breymann's Grammar, Chapter IV.* (Adjectives) and *Chapter V.* (to the end of Relative Pronouns).

2. *Matriculation French Papers. The Extracts in four papers* (XVI. to XIX.). Written translation.

3. *Rapid translation,* as before.

4. *Word-lists and Phrase-lists,* as before. Much depends upon the latter—notes on idiom, which should be carefully compiled from the dictionary and other sources.

III. ENGLISH.

Notes on September and October Work.

Beach: Syntax, Punctuation, Prosody, History of the Language, Derivation and Composition.

(1) Under *Syntax*, our readers will be preparing themselves to deal with the sentences usually given to 'correct or justify.' Our advice is, on no account to *plunge* at the answers. Many of the sentences are familiar expressions, which it is necessary to scrutinise carefully, before the grammatical 'points' become manifest. Others are incorrect *in the sense in which they are commonly used*, but capable of another correct meaning. Others violate the strict laws of grammar, but are justified by usage.

(2) *The Adverbial Objective* should be studied in all its uses.

(3) The difference between an Objective complement ('He struck the man *dead*') and an indirect predicate ('He found the man dead') is a difficult subject.

(4) Prepare notes and examples of the peculiarities of the syntax of the relative and its antecedent.

(5) Prepare a complete scheme of English conditional sentences.

(6) Analyse a number of short complex sentences, containing adverbial clauses of *degree*.

(7) Pronouns supply a number of anomalous idioms. The London Examiners do not seem to tire of 'It is me.' For a full treatment, see the answer in this number.

(8) The uses of the Subjunctive and of the Infinitive should be definitely known. The latter (June, 1891) is a difficult question, because the Simple and Gerundial Infinitives, though widely different in *use*, are indistinguishable in *form*. Our readers will find in this number what we suggest for a model answer.

(9) 'The History of the Language' should be the subject of prolonged study and wide reading. *Hewitt and Beach's* chapters are very thorough (pp. 457-498; parts of 514-530).

(10) Question 14 of the English Language paper brings out an important law concerning prefixes and suffixes.

(11) What are hybrids?

English Course for November.

1. *Beach, pp. 214-216* (Substitution of Sounds and Grimm's Law).—This reading should be supplemented.

2. *Accentuation.*—Some attention should be given to this subject. For rules as to the position of the accent, influence of Norman-French, accent of compound words, words distinguished by accent only, see *H. and B.* or *Mason.*

3. *Prosody and Analysis.*—Continued practice.

4. *English History to 1399, with the Geography relating thereto.*—Revise in Ransome, mark parts forgotten, and begin to commit 'outlines' to memory.

IV. MATHEMATICS.

Course for November

1. *Arithmetic.*—Regular working of difficult examples. Study Matriculation papers. Practise the metric system.

2. *Algebra.—Capel's Handbook.*—Read again Chapters XXXII. to XXXIV. on Quadratic Equations and Expressions, and then XXXV. (with examples) on Quadratics. Study the question of double answers, and compare Question 10 of the June paper. Then XXXVII. and XXXVIII. on Arithmetical and Geometrical Progression.

3. *Geometry.—Hall and Stevens, pp. 250 to 273* (Book IV., with exercises).

V. MECHANICS.

Course for November.

Magnus, Chapter VIII. (Centre of Gravity).—Some of our readers find the Mechanics peculiarly difficult. If necessary, they should secure personal tuition in good time. Test questions of the Matriculation type are to be found at the end of the book.

VI. CHEMISTRY.

Morris's Class-Book has now been read on the subjects mentioned in the Syllabus. In revising, we advise candidates to supplement Morris by Kemshead (Collins), Roscoe (Macmillan), or Jago (Longmans). In the last the descriptions of experiments are very clear. After seeing practical experiments, descriptions in the text-books should be studied, and drawings made of the apparatus.

HEAT AND LIGHT.

Course for November.

Wallace Stewart, Light, Chapters V. to VII. (Reflexion at spherical surfaces, Refraction, Refraction through prisms and lenses).—Go through the 'calculations' without the book, and practise drawing the diagrams rapidly.

ELEMENTARY LESSONS IN AGRICULTURE.

BY PROF. GREEN,

Examiner in Botany to Cambridge University.

VI.

The Relation of the Plant to Natural Agencies.

The atmosphere, light, and heat have an important influence on the life of the plant. The root, as we have seen, is the special organ by which water and substances in solution are absorbed; but, besides these things, a plant is continually taking in others by other parts. Nearly all the body of a plant is in most cases surrounded by the air, and from the air absorption of gases is continually going on. The purpose of this absorption is twofold, affording the plant in the first place the greater portion of its food supply. In the mixture of gases which we call the air there is a very small amount of one known, as carbon dioxide, which is continually being given off from the bodies of all living organisms, both animal and vegetable. Though very little of it is in the atmosphere—only, indeed, about four parts in ten thousand—this small amount is fairly constant in its occurrence, and it is from this that plants obtain the carbon which forms so great a part of their food. Besides absorbing this gas, which they require for this purpose, they, like animals, are continually taking in oxygen for the purpose of respiration or breathing. No living organism can exist for very long without fresh air, for this, or rather the oxygen it contains, is continually being used in the processes of life. So that from the air plants obtain two gases—carbon dioxide for food and oxygen for respiration.

There is a third gas present in the atmosphere, which is nitrogen. This, indeed, forms the larger part of the air—no less than between 79 and 80 per

cent. of it. But though nitrogen, as we have seen, is required constantly by plants as part of their food, they do not absorb any perceptible quantity free from the air.

While we are speaking of the relation of the plant to the atmosphere we must remember that plants give off gases from their substance as well as absorb them. The two processes we have spoken of are both associated with this evolution, or giving off of gas. When a plant is absorbing carbon dioxide it decomposes it, retaining the carbon but giving off a quantity of oxygen. So, again, while it is always absorbing oxygen it, by reason of the same process of respiration, gives off some carbon dioxide just as animals do. There are two processes of gaseous interchange, therefore, taking place, and we must consider the conditions under which this is happening.

Before we do so, however, we will try to ascertain the method by which gases become absorbed by the plant. We have seen that the various mineral bodies that it takes up are in solution in water, and are so taken up by the delicate hairs which grow from the surface of the root. It is also found that gases must be dissolved before they can enter the plant. The air, as we have seen, surrounds nearly all the plant, generally all of it except the roots. All the young parts that are so exposed are covered with a delicate coating called the epidermis, which is made up of a single layer of vegetable cells. These cells have usually a fairly thick external wall, which is saturated with moisture. Now when a gas is exposed to a surface of a fluid, if it is soluble in it, it, or some of it, at once becomes dissolved. Both carbon dioxide and oxygen are soluble in water, and so they become dissolved in the water that is present in the cell wall of the epidermis. From this they diffuse into the interior of the cells, and from these cells they make their way into the other cells, which make up the interior of the plant. Everything that a plant takes in is thus seen to be taken in by the process of solution.

Some kinds of plants, however, are never surrounded by air, but live submerged in water. These absorb gases just as the others do, but the gases in this case are already dissolved in the water which surrounds the plant.

There is still another interchange taking place between the plant and the air. If a piece of a growing plant, for instance, a slip of a geranium, be shut up in a tightly-stoppered bottle and left for a few days it will be found that the sides of the bottle are covered with small drops of water, and that the geranium has become flaccid or withered. If the soil in which a plant is growing is allowed to become dry the plant hangs its head or droops. On watering the soil now, it is found that soon the plant revives. The same thing may be seen on observing the behaviour of cut flowers. If they are left lying on a table they soon droop or wither; if their stalks are placed in water they remain fresh for a much longer time. What is the interpretation of all these experiments? We have already seen that plants are continually taking in water by their roots. Just as constantly they are giving off water by their leaves. The water found bedewing the side of the bottle in our first experiment was given off by the plant. When it was first put in, its cells were charged with water or sap. When looked at later it was drooping or withered. The plant had parted with the water from its cells and these were no longer distended by it, or *turgid*, and so it drooped. The water could not, however, at any time have been seen to exude from the leaves. It was given off from it in the form of aqueous vapour, and this then became condensed on the side of the bottle and formed the drops which we saw.

This process is continually going on—the air is constantly receiving a quantity of aqueous vapour from the plant. The water which a plant takes in by its roots passes through the body of the plant and is evaporated from the leaves. This process is known as *transpiration*. It is of very great importance, as it is mainly by its means that a large amount of water is made to pass through a plant. When we consider what a very small amount of food substance is dissolved in the water which the root takes up, we see how necessary it is that a large volume of such water shall be made to traverse the plant's substance.

We see then that the relation of the plant to the atmosphere includes at least three important processes—the taking in of food; respiration or breathing; and transpiration, or the giving off of watery vapour. We must study these all a little more closely by-and-by; but for the present we must try to ascertain a little more about the general relation of the plant to other natural agencies. As these processes are continually going on, and constitute so large a part of the plant's life, it is natural to think that whatever influence light, heat, or moisture in the air can exercise, will be seen in variations in them.

Let us see then what difference light makes to a plant's behaviour and well-being. And we will consider the question of light now quite apart from the direction in which it comes, supposing, in fact, that the plant is equally illuminated on all sides. We will study, too, the influence of light only on mature organs, for we shall see by-and-by that light has a good deal to do in one way or another with growth.

Now, first, what influence has light on the process of taking in carbon dioxide? This is very important, indeed. If two plants are observed side by side, one of which is allowed to receive the sun's rays, and the other is shielded from them completely, though each may be supplied with carbon dioxide in the air surrounding it, only the one which has access to light will be found to increase in weight. When a plant gains in weight it is found to be due to the formation of starch and other products, which are really derived from the carbon dioxide which the plant takes up. We see consequently that the absorption of carbon dioxide, the first of the functions we are studying, only takes place during the day. When night falls, there being no light afforded, this process stops. The importance of a proper illumination of the plant is thus very evident; if it does not have it, it cannot absorb the carbon dioxide, and so undergoes a kind of starvation.

This can be seen again from another experiment. If a potato be put into a damp cellar, at a certain time of the year, it will begin to sprout, and for a while its shoots will elongate, and it will grow. But this growth is not associated with a gain in weight, as it is if the potato is allowed access to the light; on the contrary, if it be weighed before being put into the cellar and weighed again after it has grown for some time, the weight in the second case will be actually less than that of the original tuber. Why is this? In the growth it has made use of a good deal of starch and other products which were stored in its cells. It has given off

a large amount of carbon dioxide in its respiration, and has lost, too, a considerable quantity of watery vapour. This not being compensated for by any absorption of carbon dioxide it has lost weight, even though it has grown and, to a certain extent, developed.

But this is not all. If we go back to the first experiment we made just now, we shall see that of the two plants we began to study only one is green. The one kept in darkness has become a pale yellowish white. If we transfer it now to light, very soon the green colour begins to appear, and after a while it is just like the other one. Only plants exposed to light, therefore, can form the green colouring matter. We shall see soon that this green colouring matter has a good deal to do with the manufacture of starch from the carbon dioxide, which the plant absorbs in the light.

Now, just as light is necessary for this process, so it is important that a suitable amount of light shall be given to a plant. In too strong sunlight the plant suffers, losing the intensity of its green colour and becoming yellow.

On the other two processes, respiration and transpiration, light does not exercise so much influence. The absorption of oxygen goes on all night as well as all day, and is attended, too, by the evolution of carbon dioxide. Transpiration is more active in light than in darkness, but it is probable that the influence is an indirect one, for exposure to light usually is accompanied by a rise of temperature, and this we shall see has a good deal to do with the exhalation of watery vapour.

The temperature to which a plant is exposed has a good deal of influence on all its vital processes. We can find by experiment that if the plant is too cold the absorption of carbon dioxide is stopped. If it is made gradually warmer this process begins, and as the temperature rises the activity in this respect rises also, up to a certain limit. There is for every plant a certain temperature at which this is most active. Above this point the activity declines again, and at too high a temperature it is stopped altogether. This can be seen by observing a water plant, and noticing the bubbles of oxygen which are seen to rise from it while it is absorbing the carbon dioxide. The temperature of the water can be gradually raised, and as the experiment goes on the number of these bubbles given off, say, in each minute, can be counted. In the case of a plant named *Hottonia palustris* such an experiment showed that the temperature at which this process was most active was 31° C. When the water reached 56° C. the bubbles ceased altogether to appear. We have thus three points of temperature to notice. The lowest temperature at which the process can go on is called the *minimum*; that at which it is most vigorous is the *optimum*, and that at which it stops is the *maximum*. These three points are found to exist in the case of all the other functions as well as the one we are considering, though the same point does not equally affect all these functions.

The process of respiration is affected similarly. The optimum temperature for this has been ascertained for the garden *Nasturtium* to be about 35° C.

It is rather difficult to study the influence of temperature alone on transpiration, because the amount of moisture in the air depends very much on the temperature. When the air is warm it will hold more watery vapour than when it is cold. It is best, therefore, to consider these together. A plant in an atmosphere which is saturated with watery vapour will not transpire unless its own temperature is higher than that of the air. This does not often happen, but it may take place when the chemical processes which go on in the plant are very active. Chemical activity is usually found to be connected with the evolution of heat, and so under these conditions the plant will continue to give off watery vapour though the air may be saturated. When the plant and the air are equally warm, the activity of transpiration diminishes with increasing moisture in the air. On the other hand, when the air is warm and dry transpiration is promoted.

If too great extremes of either heat or cold are allowed to meet the plant it suffers very much, and if they affect it for too long a time the plant is killed. This can be seen well on examining the plants in a garden after a sharp frosty night. They are, to use the gardener's language, 'cut by the frost.' The evil effects of the frost on any plant will be found to depend very much on the amount of water which the plant's cells contain. A perfectly dry seed will be able to withstand great cold much better than a succulent part, such as a young stem or leaf.

The same thing has been seen to exist with regard to too high a temperature. The drier a part of a plant is the better it can endure a great heat. The dry seeds of a great number of plants have been found to resist a temperature of 77° C. for two days without any injury. The amount of water in the seeds has a great deal to do with the temperature they can stand. If they are heated in water they are killed at a lower temperature, and in shorter time than if they are heated in dry air.

The temperature has also an influence on another process which has not yet been mentioned, the *germination* of seeds. Here there is, as in other cases, a *minimum* temperature, below which they will not germinate at all; an *optimum* at which they germinate most readily, and a *maximum* one which stops germination entirely by killing the seed.

Moisture, too, has a part to play in germination. A prolonged soaking in water at ordinary temperatures is injurious to seeds, so that every seed-bed should be well drained. The seed, even if soaked, can resist a higher temperature than either stems, leaves, or roots.

We shall see by-and-by that the growth of a plant is much affected by these same natural agencies.

To recapitulate, we see that—

1. Plants are continually absorbing gases from the air. Of these, carbon dioxide is absorbed during the time the plant is exposed to light, and is being used to build up the plant's substance. Oxygen is absorbed at all times to subserve the purposes of respiration. Nitrogen is not absorbed from the air.

2. Plants are continually giving off gases to the air. These are (α) oxygen, which results from the subsequent changes set up after the absorption of the carbon dioxide; (β) carbon dioxide, which is the waste matter thrown off by the plant in respiration; (γ) watery vapour, which arises from the evaporation of the water taken in by the roots from the soil.

3. The various processes of absorption of carbon dioxide, respiration, and transpiration are very much affected by the conditions of light, temperature, and moisture to which the plant is exposed.

4. The germination of the seed is also affected to a very large degree by the same natural agencies.

THE COOLING SPRING.

Music by THOMAS MURBY.

Allegro moderato.

1st & 2nd TREBLES. TENOR. BASS. PIANO

1. O a good-ly thing is the cool-ing spring By the rock where the moss doth grow; There is

Key E♭. *Allegro moderato.*

1st S. 2nd S. T. B.

1. O a good-ly thing is the cool-ing spring By the rock where the moss doth grow; There is

cres.

health in the tide, and there's mu-sic be-side In the brook-let's bound-ing flow. Mer-ry, mer-ry, mer-ry lit-tle

cres.

health in the tide, and there's mu-sic be-side In the brooklet's bound-ing flow. Merry, mer-ry, mer-ry, lit-tle

f

spring, Spar-kle on, spar-kle on! Mer-ry, mer-ry, mer-ry lit-tle spring, Spar-kle on for me!

cres. *ff*

f

spring, Sparkle on, sparkle on! Merry, mer-ry, mer-ry lit-tle spring, Sparkle on for me!

2.
And as pure as heaven is the water given,
And the stream is for ever new;
'Tis distilled in the sky, and it drops from on high
In the shower and gentle dew.
Merry little spring, &c.

3.
Let them say 'tis weak, but its strength I'll seek,
And rejoice while I hold its sway;
For its murmur to me is the echo of glee,
And it laughs as it bounds away.
Merry little spring, &c.

4.
O I love to drink from the foaming brink
Of the bubbling and cooling stream;
And its drops that do shine shall ever be mine,
While its praise life long I'll sing.
Merry little spring, &c.

LA JEUNE SIBÉRIENNE.

TRANSLATED BY PROFESSOR DARQUÉ.

(*Author of 'Pupil-Teachers' French Course.'*)

LA JEUNE SIBERIENNE.

Le lendemain, elle s'empressa de consulter l'homme qu'on lui avait indiqué:[112] elle apprit de lui que la supplique devait être signée par elle-même. L'écrivain se chargea de la dresser dans les formes requises; et, lorsqu'elle fut achevée, Lopouloff, après quelque résistance, consentit à ce qu'elle fût expédiée, et profita de l'occasion pour y joindre une nouvelle lettre relative à ses affaires personnelles.

Dès ce moment les inquiétudes de la jeune personne disparurent, sa santé se raffermit, et ses parents furent charmés de lui voir reprendre sa gaieté naturelle. Cet heureux changement n'avait d'autre cause que la certitude où elle était d'obtenir son passeport, et sa confiance sans bornes en la protection de Dieu. Elle allait souvent se promener[113] sur le chemin de Tobolsk, dans l'espérance de voir arriver quelque courrier. Elle passait devant la station de la poste[114] aux chevaux pour parler au vieil invalide[115] qui en avait la direction, et qui distribuait le peu de lettres adressées à Ischim. Mais depuis longtemps elle n'osait[116] lui en demander, parce qu'il lui avait parlé avec brusquerie, et s'était moqué de son projet de voyage qu'il connaissait.

Six mois s'étaient presque écoulés depuis le départ de la supplique, lorsqu'on vint avertir la famille qu'un courrier était à la poste avec des lettres pour quelques personnes. Prascovie y courut aussitôt et fut suivie de ses parents. Lorsque Lopouloff se nomma, le courrier lui remit un paquet cacheté, contenant un passeport pour sa fille, et prit un reçu de lui. Ce fut un moment de joie pour la famille. Dans l'abandon total où ils étaient depuis tant d'années, l'envoi de ce passeport leur parut une espèce de faveur. Cependant il n'y avait dans le paquet aucune réponse du gouverneur aux demandes personnelles de Lopouloff. Pour sa fille, elle était libre, et l'on ne pouvait, sans la plus grande injustice, la retenir en Sibérie contre sa volonté.

Le silence absolu que l'on[117] gardait avec son père était plutôt une confirmation de sa disgrâce qu'une faveur. Cette triste réflexion dissipa bientôt[118] l'impression de plaisir que lui avait fait éprouver la condescendance du gouverneur. Lopouloff s'empara du passeport, et déclara, dans le premier moment d'humeur,[119] qu'il n'avait consenti à le demander que dans la certitude qu'on[120] le lui refuserait, et pour se délivrer des persécutions de sa fille.

Prascovie suivit ses parents à la maison sans rien demander, mais remplie d'espoir et remerciant Dieu le long du

THE YOUNG SIBERIAN.

The next day she hastened to consult the man who had been pointed out to her: she learned from him that the petition had to be signed by herself. The writer undertook to draw it in the required form; and, when it was completed, Lopouloff, after some resistance, consented to its being sent off, and took advantage of the opportunity to send with it a new letter about his own business.

From that moment the anxiety of the young person vanished, her health improved, and her parents were delighted to see her resume her natural cheerfulness. This happy change had no other cause than the certainty she had of obtaining her passport, and her confidence in God's protection was boundless. She often went for a walk on the Tobolsk road, in the hope of seeing some courier arrive. She used to pass before the posting-house in order to speak to the old invalid who was at the head of it, and who distributed the few letters sent to Ischim. But for a long time she had not dared to ask him whether there were any, because he had spoken to her abruptly, and had laughed at her intended journey, of which he had heard.

Nearly six months had elapsed since the petition had been sent off, when some one came to inform the family that there was at the posting-house a courier with letters for a few persons. Prascovie hastened *to go* there at once, and was followed by her parents. When Lopouloff gave his name, the courier delivered to him a sealed packet, containing a passport for his daughter, and made him sign a receipt for it. It was a joyful moment for the family. In the utter forlorn state in which they had lived for so many years, the sending of that passport appeared to them a kind of favour. Yet there was in the packet no answer from the governor to the personal demands of Lopouloff. As for his daughter, she was free and they could not, without the greatest injustice, detain her in Siberia against her will.

The absolute silence which they kept with *regard to* her father was rather a confirmation of his disgrace than a favour. This sad reflection soon dispelled the pleasurable impression which the governor's condescension had made him experience. Lopouloff took possession of the passport, and declared in the first moment of ill humour that he had consented to ask for it only because he was certain that it would be refused him, and in order to free himself from the persecutions of his daughter.

Prascovie followed her parents home without asking any questions, but full of hope and thanking God as she went

NOTES.

(112) *On lui avait indiqué.* The French studiously avoid the use of the so-called passive verbs when no suffering is alluded to. They prefer the transitive form of the verb with *on* for its subject in reference to persons: *On m'a dit*, I was told; and the reflexive when speaking of things, if completion of an action is not referred to: corn is sold at five shillings a bushel, *le blé se vend cinq schellings le boisseau.*

(113) *Promener*, to take for a walk; *se promener*, to go for a walk.

(114) Do not mistake *le poste* for *la poste.*

(115) *Invalide* here means either a soldier or sailor that has been pensioned off.

(116) *Elle n'osait depuis.* The imperfect—and not the pluperfect as in English—is used, because she still did not dare.

(117) *L'on. L'* is a mere euphonic letter often used after *que, et, ou, où, si*, etc., to prevent the hiatus that would arise from the meeting of the two vowel-sounds.

(118) French adverbs invariably follow the personal simple tenses of the verbs which they modify. *Ne* is the only one which always precedes the verb.

(119) *Moment d'humeur, i.e., de mauvaise humeur.*

(120) *Qu'on.* The euphonic *l'* is undesirable, because the next word begins with *l*; alliteration is objected to in French.

THE COOLING SPRING.

Music by THOMAS MURBY.

Allegro moderato.

1st & 2nd TREBLES. TENOR. BASS. PIANO

1. O a good - ly thing is the cool - ing spring By the rock where the moss doth grow; There is

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And the stream is for ever new;
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Dès ce moment les inquiétudes de la jeune personne disparurent, sa santé se raffermit, et ses parents furent charmés de lui voir reprendre sa gaieté naturelle. Cet heureux changement n'avait d'autre cause que la certitude où elle était d'obtenir son passeport, et sa confiance sans bornes en la protection de Dieu. Elle allait souvent se promener[113] sur le chemin de Tobolsk, dans l'espérance de voir arriver quelque courrier. Elle passait devant la station de la poste[114] aux chevaux pour parler au vieil invalide[115] qui en avait la direction, et qui distribuait le peu de lettres adressées à Ischim. Mais depuis longtemps elle n'osait[116] lui en demander, parce qu'il lui avait parlé avec brusquerie, et s'était moqué de son projet de voyage qu'il connaissait.

Six mois s'étaient presque écoulés depuis le départ de la supplique, lorsqu'on vint avertir la famille qu'un courrier était à la poste avec des lettres pour quelques personnes. Prascovie y courut aussitôt et fut suivie de ses parents. Lorsque Lopouloff se nomma, le courrier lui remit un paquet cacheté, contenant un passeport pour sa fille, et prit un reçu de lui. Ce fut un moment de joie pour la famille. Dans l'abandon total où ils étaient depuis tant d'années, l'envoi de ce passeport leur parut une espèce de faveur. Cependant il n'y avait dans le paquet aucune réponse du gouverneur aux demandes personnelles de Lopouloff. Pour sa fille, elle était libre, et l'on ne pouvait, sans la plus grande injustice, la retenir en Sibérie contre sa volonté.

Le silence absolu que l'on[117] gardait avec son père était plutôt une confirmation de sa disgrâce qu'une faveur. Cette triste réflexion dissipa bientôt[118] l'impression de plaisir que lui avait fait éprouver la condescendance du gouverneur. Lopouloff s'empara du passeport, et déclara, dans le premier moment d'humeur,[119] qu'il n'avait consenti à le demander que dans la certitude qu'on[120] le lui refuserait, et pour se délivrer des persécutions de sa fille.

Prascovie suivit ses parents à la maison sans rien demander, mais remplie d'espoir et remerciant Dieu le long du

The Young Siberian.

The next day she hastened to consult the man who had been pointed out to her: she learned from him that the petition had to be signed by herself. The writer undertook to draw it in the required form; and, when it was completed, Lopouloff, after some resistance, consented to its being sent off, and took advantage of the opportunity to send with it a new letter about his own business.

From that moment the anxiety of the young person vanished, her health improved, and her parents were delighted to see her resume her natural cheerfulness. This happy change had no other cause than the certainty she had of obtaining her passport, and her confidence in God's protection was boundless. She often went for a walk on the Tobolsk road, in the hope of seeing some courier arrive. She used to pass before the posting-house in order to speak to the old invalid who was at the head of it, and who distributed the few letters sent to Ischim. But for a long time she had not dared to ask him whether there were any, because he had spoken to her abruptly, and had laughed at her intended journey, of which he had heard.

Nearly six months had elapsed since the petition had been sent off, when some one came to inform the family that there was at the posting-house a courier with letters for a few persons. Prascovie hastened *to go* there at once, and was followed by her parents. When Lopouloff gave his name, the courier delivered to him a sealed packet, containing a passport for his daughter, and made him sign a receipt for it. It was a joyful moment for the family. In the utter forlorn state in which they had lived for so many years, the sending of that passport appeared to them a kind of favour. Yet there was in the packet no answer from the governor to the personal demands of Lopouloff. As for his daughter, she was free and they could not, without the greatest injustice, detain her in Siberia against her will.

The absolute silence which they kept with *regard to* her father was rather a confirmation of his disgrace than a favour. This sad reflection soon dispelled the pleasurable impression which the governor's condescension had made him experience. Lopouloff took possession of the passport, and declared in the first moment of ill humour that he had consented to ask for it only because he was certain that it would be refused him, and in order to free himself from the persecutions of his daughter.

Prascovie followed her parents home without asking any questions, but full of hope and thanking God as she went

Notes.

(112) *On lui avait indiqué.* The French studiously avoid the use of the so-called passive verbs when no suffering is alluded to. They prefer the transitive form of the verb with *on* for its subject in reference to persons: *On m'a dit*, I was told; and the reflexive when speaking of things, if completion of an action is not referred to: corn is sold at five shillings a bushel, *le blé se vend cinq schellings le boisseau.*

(113) *Promener*, to take for a walk; *se promener*, to go for a walk.

(114) Do not mistake *le poste* for *la poste.*

(115) *Invalide* here means either a soldier or sailor that has been pensioned off.

(116) *Elle n'osait depuis.* The imperfect—and not the pluperfect as in English—is used, because she still did not dare.

(117) *L'on.* *L'* is a mere euphonic letter often used after *que, et, ou, où, si*, etc., to prevent the hiatus that would arise from the meeting of the two vowel-sounds.

(118) French adverbs invariably follow the personal simple tenses of the verbs which they modify. *Ne* is the only one which always precedes the verb.

(119) *Moment d'humeur, i.e., de mauvaise humeur.*

(120) *Qu'on.* The euphonic *l'* is undesirable, because the next word begins with *l*; alliteration is objected to in French.

chemin[121] d'avoir exaucé l'un de ses vœux.[122] Son père serra le passeport parmi ses hardes, après l'avoir enveloppé soigneusement dans un morceau de linge. Prascovie remarqua cette précaution, qui lui parut de bon augure, car il aurait pu le déchirer ;[123] elle n'attribua le refus de son père qu'à un dessein particulier de la Providence, qui n'avait pas encore marqué l'heure de son départ. Bientôt après, elle se rendit au bois, où elle passa deux heures à prier, se livrant à toute la joie que son ardente imagination lui inspirait, et n'ayant plus aucun doute sur le succès de son entreprise.

along for having granted one of her wishes. Her father laid the passport by among his clothes, after having carefully wrapped it in a piece of linen. Prascovie noticed that precaution, which appeared to her of good omen, for he might have torn it; she attributed her father's refusal only to a particular design of Providence, who had not yet fixed the time of her departure. Soon after she repaired to the wood, where she spent two hours in prayer, indulging in all the joy which her fervent imagination inspired her with, and no longer entertaining any doubt as to the success of her undertaking.

(121) *Le long du chemin* may be rendered by 'along the road.'

(122) The proper meaning of *vœu* is 'vow.'

(123) *Il aurait pu le déchirer* literally means 'he would have been able to tear it.'

Ces détails pourront[124] paraître à quelques personnes puérils et minutieux ; mais lorsqu'on verra[125] les projets de cette jeune fille réussir au delà de ses espérances et de toute probabilité, malgré les obstacles sans nombre qu'elle avait à surmonter, on se convaincra qu'aucun motif humain n'aurait suffi pour la conduire au but qu'elle se proposait, et qu'il fallait pour une telle œuvre cette *foi qui transporte les montagnes.* Dans tout ce qui lui arrivait,[126] Prascovie voyait toujours le doigt de Dieu. Aussi disait-elle : 'J'ai été quelquefois éprouvée, mais jamais trompée[127] dans ma confiance en lui.' Un incident qui eut lieu peu de jours après vint encore ranimer son courage, et contribua peut-être à déterminer ses parents. Sa mère, sans être absolument superstitieuse, s'amusait parfois à chercher des pronostics de l'avenir dans les plus petits événements de la vie. Sans croire aux jours malheureux, elle évitait cependant d'entreprendre quelque chose le lundi,[128] et n'aimait point à renverser la salière. Quelquefois elle prenait la Bible, et, l'ouvrant au hasard, elle cherchait dans la première phrase qui lui tombait sous[129] les yeux quelque chose[130] d'analogue à sa situation et dont elle pût tirer un bon augure. Cette manière de consulter le sort est très-usitée en Russie : lorsque la phrase est insignifiante, on recommence, et en tirraillant[131] un peu le sens on finit par lui donner la tournure qu'on désire. Les malheureux s'attachent à tout, et sans ajouter beaucoup de foi à ces prédictions, ils éprouvent un certain plaisir lorsqu'elles s'accordent avec leurs espérances.

These particulars may, to some persons, appear puerile and trifling ; but when we see the plans of this young girl succeed beyond her hopes and all probability, in spite of the innumerable obstacles she had to overcome, we shall be convinced that no human motive could have sufficed to lead her to the purpose she had in view, and that in order *to perform* such a work it was necessary to have that *faith which moves mountains.* In all that happened to her, Prascovie always saw the finger of God. Therefore, she used to say : 'I was sometimes tried, but never disappointed in my trust in Him.' An incident which took place a few days after came to strengthen her courage still more, and contributed, perhaps, to determine her parents. Her mother, without being absolutely superstitious, sometimes diverted herself by looking for prognostics of the future in the least events of life. Without believing in unlucky days, she, however, avoided undertaking anything on a Monday, and did not like to upset the salt-cellar. Sometimes she would take her Bible, and opening it at random she sought in the first sentence that caught her eye something analogous to her situation and from which she might draw a good omen. This manner of questioning fate is very common in Russia ; when the sentence is insignificant, one begins again, and by slightly distorting the sense one succeeds in giving the meaning one wishes for. The unfortunate cling to anything, and without putting much faith on those predictions, they feel a certain pleasure when they agree with their hopes.

(124) *Pourront.* Instances of this use of the future instead of the present indicative are often met with.

(125) *On verra.* In this and similar sentences, where a time to come is unquestionably pointed out, the French invariably use the future : *Je le ferai quand vous reviendrez*, I shall do it when you come back.

(126) Notice this additional instance of the figurative meaning of *arriver.*

(127) *Déçue* would perhaps be a more appropriate term than *trompée* in this sentence.

(128) Monday in Russia and Friday in England are by many supposed to be days of bad omen. Notice that the names of the days and months are written in French with small initial letters when they do not begin a sentence.

(129) *Tomber sous les yeux*, to catch the eye, the sight.

(130) *Quelque chose de.* Words expressive of quantity require *de* after them when they are followed by either an adjective or participle used without a noun, or by an adverb : *vingt hommes de tués*, twenty men killed ; *rien de mieux*, nothing better. Observe that *quelque chose*, something, is masculine.

(131) *Tiraillant* might here be translated by 'stretching.'

Lopouloff était dans l'usage de lire le soir un chapitre de la Bible à sa famille : il expliquait aux femmes les mots Slavons[132] qu'elles ne comprenaient pas, et cette occupation plaisait infiniment à sa fille. A la fin d'une triste soirée, ces trois solitaires étaient auprès[133] d'une table sur laquelle était le livre saint ; la lecture était achevée, et le plus morne silence régnait entre eux, lorsque Prascovie s'adressant à sa mère, sans autre but que celui de renouer la conversation : 'Ouvrez, je vous prie, la Bible, lui dit-elle, et cherchez dans la page à droite, la onzième ligne.' Sa mère prit le livre avec empressement et l'ouvrit avec une épingle ; ensuite, comptant les lignes

Lopouloff was in the habit of reading in the evening a chapter of the Bible to his family : he explained to the women the Slavonic words which they did not understand, and that occupation greatly pleased his daughter. At the close of a sad evening those three lonely ones were near a table on which lay the holy book ; the reading was over, and the most mournful silence reigned among them, when Prascovie, addressing her mother, without any other object besides that of resuming the conversation : 'Pray, open the Bible,' she said to her, 'and look on the page on the right for the eleventh line.' Her mother eagerly took the book and opened it with a pin ;

(132) Common nouns and adjectives derived from the names of nations are now written with small initial letters, when they do not, of course, begin a sentence.

(133) *Auprès* seems to imply a closer proximity than *près.*

jusqu'à[134] la onzième à droite, elle lut à haute voix les paroles[135] suivantes :

'Or un ange de Dieu appela Agar du ciel et lui dit : Que faites-vous là ? ne craignez point.'

L'application de ce passage de l'Écriture sainte était trop facile à faire pour que l'analogie frappante qu'il présentait avec le voyage projeté pût échapper à personne. Prascovie, transportée de joie, prit la Bible et en[136] baisa les pages à plusieurs reprises[137]. 'C'est vraiment singulier,' disait la mère en regardant[138] son mari. Mais celui-ci, ne voulant pas favoriser leur idée à ce sujet, s'éleva fortement contre ces ridicules divinations. 'Croyez-vous, disait-il aux deux femmes, que l'on puisse ainsi interroger Dieu en ouvrant un livre avec une épingle, et qu'il daigne répondre à toutes vos folles pensées ? Sans doute, ajouta-t-il, en s'adressant à sa fille, un ange ne manquera pas de vous accompagner dans votre extravagant voyage, et de vous donner à boire quand vous aurez soif ![139] Ne sentez-vous pas quelle est la folie de s'abandonner à de semblables espérances ?'

Prascovie lui répondit qu'elle était bien loin d'espérer qu'un ange lui apparût[140] pour l'aider dans son entreprise. 'Mais cependant, disait-elle, j'espère et crois fermement que mon ange gardien ne m'abandonnera pas, et que mon voyage aura lieu, quand[141] je m'y opposerais moi-même.' Lopouloff était ébranlé par cette persévérance inconcevable ; cependant un mois s'écoula sans qu'il fût question du départ. Prascovie devenait silencieuse et préoccupée : toujours seule dans le bois ou dans son réduit, elle ne donnait plus aucune marque de tendresse à ses parents. Comme elle avait souvent menacé de partir sans passeport, ils commencèrent à craindre sérieusement qu'elle n'accomplît[142] son projet, et ils prenaient de l'inquiétude lorsqu'elle s'absentait de la maison plus longtemps qu'à l'ordinaire. Il arriva même qu'un jour ils la crurent décidément partie :[143] Prascovie, en revenant de l'église, où elle était allée seule, avait accompagné de jeunes paysannes dans une chaumière voisine et s'y était arrêtée quelques heures. Lorsqu'elle revint à la maison, sa mère l'embrassa toute en larmes. 'Tu as bien tardé, lui dit-elle. Nous avons cru que tu nous avais quittés pour toujours !—Vous aurez bientôt ce chagrin, lui répondit sa fille, puisque vous ne voulez pas me livrer le passeport : vous regretterez alors de m'avoir privée de cette ressource et de votre bénédiction.' Elle prononça ces paroles sans répondre aux caresses de sa mère et d'un ton de voix si triste, si altéré, que la bonne femme en fut vivement affectée. Elle lui promit, pour la tranquilliser, de ne plus[144] mettre d'opposition à son départ, qui dépendrait uniquement de la permission de son père. Prascovie ne la demandait plus ; mais sa profonde tristesse la sollicitait plus éloquemment que n'auraient[145] pu le faire les supplications les plus vives : Lopouloff lui-même ne savait[146] à quoi se résoudre.

afterwards, reckoning the lines down to the eleventh on the right, she read aloud the following words :

'Now an angel of God called Hagar from heaven and said to her : What art thou doing there ? fear not.'

The application of that passage of the Holy Scriptures was too easy to make in order that the striking analogy which it showed with the intended journey could escape any one. Prascovie, transported with joy, took the Bible and kissed its pages several times. 'It is truly singular,' said the mother, looking at her husband. But the latter, unwilling to favour their idea on this subject, rose strongly against those ridiculous divinations. 'Do you believe,' said he to the two women, 'that one can thus question God by opening a book with a pin, and that He will deign to answer all your foolish thoughts ? Doubtless,' he added, addressing his daughter, 'an angel will not fail to accompany you during your extravagant journey, and to supply you with drink when you are thirsty. Do you not feel how foolish it is to trust such hopes ?'

Prascovie replied to him that she was far from hoping that an angel would appear to her to help her in her undertaking. 'But, however,' she said, 'I do hope and firmly believe that my journey will take place even though I should myself object to it.' Lopouloff was shaken by this inconceivable perseverance ; yet a month elapsed without any allusion to the departure. Prascovie was becoming silent and thoughtful ; always alone in the wood or in her little room, she no longer gave any tokens of affection to her parents. As she had often threatened to start without passport, they began to fear seriously lest she should carry out her intentions, and they became uneasy when she absented herself from home longer than usual. It even happened one day that they thought she had really gone. Prascovie, on her return from church, whither she had gone alone, had accompanied some young peasant girls to a neighbouring cottage and had stopped there a few hours. When she returned home her mother embraced her bathed in tears. 'You are very late,' she said to her. 'We thought you had left us for ever.' 'You will soon have that sorrow,' her daughter answered her, 'since you will not give me the passport : you will then regret having deprived me of that resource and of your blessing.' She uttered those words without returning her mother's caresses, and in so sad and altered a tone of voice, that the good woman was deeply moved by it. She promised her, in order to calm her, no longer to oppose her departure, which would depend entirely on her father's permission. Prascovie no longer asked for it ; but her deep sadness solicited it more eloquently than the most lively entreaties could have done ; Lopouloff himself knew not what resolution to take.

(134) *Jusqu'à.* Literally 'as far as,' or 'up to.'

(135) *Paroles* was originally used only in reference to spoken words, but it often is now synonymous with *mots*.

(136) We cannot say *baisa ses pages*, because *la Bible* is not the subject of the sentence, nor is *la Bible* the object of a preposition. Those are the two chief instances in which *son, sa, ses, leur*, and *leurs* can be used in reference to things.

(137) *Reprises.* This word has so many meanings that, whenever any doubt arises, recourse should be had to a good dictionary.

(138) Notice the various ways of translating 'to look' when followed by certain prepositions.

(139) *Vous aurez soif.* Notice also the expressions : *avoir faim*, to be hungry ; *avoir raison*, to be right (morally) ; *avoir droit*, to be right (legally) ; *avoir tort*, to be wrong ; *avoir sommeil*, to be sleepy, etc.

(140) *Apparût.* The imperfect of the subjunctive is here used instead of the conditional in order to lay greater emphasis on the doubt Prascovie wished to express.

(141) *Quand*, or more usually *quand même*, may also be rendered by 'even if,' or simply 'if.'

(142) Words expressive of fearing invariably require the verb which they govern to be in the subjunctive with *ne* before it, if the thing is not desired, and with *ne...pas*, if it be desired : *je crains qu'il ne vienne*, I fear he will come ; *je crains qu'il ne vienne pas*, I fear he will not come ; *de crainte qu'il ne vienne*, for fear he should come.

(143) *La crurent partie.* The use of the personal tenses of verbs is carefully avoided in French, whenever no ambiguity can arise from the choice of an infinitive or participle.

(144) *Ne plus, ne pas, ne point, ne jamais*, and *ne rien* are the only compound negatives the component parts of which can both immediately precede the infinitives which they modify.

(145) *N'auraient pu.* Here is another instance of the necessity of *ne* after a comparative, for we could say : *les supplications les plus vives n'auraient pu demander la permission*, etc.

(146) *Ne savait à quoi.* The second part of the negative—*pas*—is often omitted after *savoir*, especially before *si*, whether, and *qui, que, quoi, quel*, etc. : *je ne sais si vous avez raison ; il ne sait que faire ; elle ne savait à quel saint se vouer.*

ESSAY WRITING FOR STANDARDS VI. & VII.

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I. The Tiger.

1. Where found.—India, China, S.E. Asia, in jungle and forest.

2. Description.—Cat-like, 5 or 6 feet long, 3 feet high, strong teeth, rough tongue, sharp claws. Food: flesh.

3. Adaptation of structure to habits:—

(*a*) Eyes for night prowling.
(*b*) Teeth and tongue for tearing.
(*c*) Claws for seizing and holding.
(*d*) Colour—similar to jungle grass.

4. Character.—Cowardly, treacherous, bloodthirsty.

Treat similarly all wild animals:—***Elephant, Lion,*** *Antelope, Bear, Wolf, Owl, Eagle, Ostrich, &c.*

II. All is not Gold that Glitters.

1. Definition of a proverb.

2. Particular meaning, illustrated by examples:—*Tinsel, Foil, &c.*

3. General meaning, illustrated by examples:—Showy dress, self-conceit, &c.

Treat similarly all proverbs. '*A bird in the hand is worth two in the bush*,' '*Take care of the pence, and the pounds will take care of themselves*,' *&c.*

III. Colonies.

1. Definition.

2. How acquired: (*a*) Conquest; (*b*) Settlement; (*c*) Treaty; (*d*) Purchase, with examples of each.

3. Uses:—

(*a*) Fields for Emigration, as Canada, Australia, New Zealand.
(*b*) Coaling Stations, as Aden, Gibraltar, Singapore, &c.
(*c*) Depôts for trade—Hong Kong, Singapore, &c.
(*d*) Markets for manufactured goods—India, Cape Colony, Australia.
(*e*) Districts from which to obtain raw produce.

4. Extent of British Colonies. 'Sun never sets on British Empire,' &c.

IV. Gold.

1. Definition.—Metal, scarce, hence valuable.

2. Properties.—Heavy, malleable, ductile, does not rust.

3. How obtained:—

(*a*) Digging in valleys, old river bottoms; dust and nuggets washed out.
(*b*) Quarrying quartz rocks, crushing to powder and extracting gold. More common method.

4. Uses:—(*a*) Money; (*b*) articles of jewellery; (*c*) covering other metals (electro-plating).

5. Where found.—Australia, California, Brit. Columbia, Cape Colony, &c.

Other metals, as *Silver, Lead, Copper*, &c., would be treated in the same way, also *Coal.*

V. Good Habits.

1. Explanation of term.

2. How acquired:—

(*a*) Copying good examples.
(*b*) Taking good advice.
(*c*) Constant practice.

3. A list of the chief good habits:—Punctuality, regularity, cleanliness, honesty, civility, &c.

4. Advantages of possession:—

(*a*) To others—companions, employers, &c.
(*b*) To ourselves.

Similarly, ***Punctuality, Cleanliness, Thrift*** (a section of which must be, Means of saving—Post Office Savings Banks, &c.), ***Honesty, Civility, Temperance.***

Any of these essays may be closed by an anecdote illustrating them.

VI. What Occupation would you like to follow when you Leave School?

1. Selection (and explanation if necessary).

2. Reasons:—

(1) Description of work.
(2) Daily duration—rate of payment.
(3) Chances of promotion or advance.
(4) Personal reasons for choice.

3. Conditions of success in any occupation. Perseverance, honesty, &c.

The following are a few subjects suitable for children:—1. Money. 2. Wild Birds. 3. Any excursion you have made. 4. Modes of travelling. 5. Newspapers. 6. A public park. 7. Any famous man. 8. The Post Office. 9. The Electric Telegraph. 10. Any public building. 11. Your School. 12. Your town or village. 13. Cruelty to Animals. 14. Paper. 15. Linen. 16. Needles. 17. Wild Flowers. 18. Garden Flowers. 19. Any invention. 20. A storm at sea. 21. Gardening. 22. Fruits. 23. Fairy Tales. 24. Way you spent your Holiday. 25. Examinations.

—o—

NEW DICTATION TESTS.

Standards IV. and V.

No. 1.

Some cabmen whose attire seemed to betoken little prosperity did not hesitate to bid liberally, and when a horse was knocked down to one of them he produced the purchase money in notes or gold from pockets unexpectedly well lined. They, and the majority of other purchasers, knew exactly what they wanted, and went for it with a spirit that did not flag up to the limit they had allowed themselves. Either by secret information or by accuracy of judgment they seemed to arrive at the relative value of horses with wonderful promptitude.

No. 2.

If you watch a bird's plumage throughout the year, you will find that it undergoes changes; and that the summer and winter clothing are not alike. The process is called *moulting*. In some cases new feathers appear in addition to those they already have; in others a few drop out, and new ones appear in their places; while in others the old feathers are entirely replaced by new ones. Birds have a sharp sense of hearing, though they have no visible ear. There is a sort of crevice on each side of the head covered with hairs, but nothing like an ear.

No. 3.

Soon after breakfast we went ashore—in more senses of the word than one; for they have begun to build a mole for the protection of small vessels, which, in its unfinished state, is not yet visible above the water. The consequence was that, at a distance of about half a mile from the landing-steps, we rowed straight on to the submerged stonework, but fortunately got off again very quickly, without having sustained any damage. On landing, we found ourselves opposite the Custom House, a fine building, with which we afterwards made a closer acquaintance.

No. 4.

After all the fine weather we have had lately, it was provoking to find, on getting up this morning, that the rain still came steadily down. Daylight enabled us to see what a quaint-looking place this hotel is. It consists of a series of low wooden detached buildings, mostly one story high, with verandahs on both sides, built round a long courtyard, in the centre of which are a garden and some large trees. The views from the walks around the hotel and in the forest above are beautiful, as, indeed, they are from every eminence in the neighbourhood of Rio.

No. 5.

But if you set his foot under the glass of a good microscope, you will see how expressly fitted that foot is for the very work which at first appeared so far beyond its reach, and how simple is the contrivance that seems able to defy the law of gravitation. In a *blow fly* or *blue-bottle*, being slightly larger than a common fly, this is even more apparent. Look well at the foot, and you will see that it is made up of two flat hollow pads, covered with fine short hairs, with a pair of curved hooks above them. Each pad has a tiny nipple, behind which lies a tiny bag filled with clear liquid gum—the hairs also being hollow, and filled with the same sticky fluid.

No. 6.

Air, when it is heated, expands and rises, and colder and heavier air comes in to supply its place. The movements of the air, whether they are slow or rapid, are called winds. Air may become lighter, not only by being warmed, but also by becoming more charged with moisture. When the atmosphere of any place becomes charged with vapour the air ascends, and the drier, heavier air comes to take its place. This also will cause wind. It is thus seen that heavy air, cold and dry, has a tendency to flow towards places where the air is light, warm, and moist.

No. 7.

In Brighton and other watering-places an afternoon stroll is deprived of all enjoyment from the same cause. In Southsea, Southampton, and many other towns it is still more abominable. The writer was a few mornings since in those beautiful gardens in Richmond which have recently been opened. Not one of the least of the charms of such places is the natural music, as it may be called, of the songs of the birds, the sound of the trees, etc., and it was hoped that something of this might be enjoyed. But, no; all this was destroyed by the too successful efforts of an organ fiend with his hideous machine, making the whole neighbourhood hateful for at least half a mile round.

No. 8.

We had a long wet walk in the forest; the mosses and ferns being kept moist and green by the innumerable little streams of water which abound everywhere. Owing to the thickness of the surrounding jungle, it was impossible to stray from our very narrow path, notwithstanding the attractions of humming-birds, butterflies, and flowers. At last we came to an opening in the wood, whence we had a splendid view seawards, and where it was decided to turn round and retrace our steps through the forest. After walking some distance we found our horses waiting, and after a hot but pleasant ride reached our destination by twelve o'clock.

No. 9.

Quitting the cage, which has dropped into its iron bed with a great clang, we crossed the arched, whitewashed corridor, picking our way through the hurly-burly of corves, coal-laden and empty, to the deputy's office, which is practically the store room of the mine, a cosy underground retreat, decorated with cheap prints, but also containing on its walls plans of the workings, charts about the temperature, pilot jackets and pitmen's caps, lamps of every sort, from the now obsolete Davy to the improved Clanny; and over the fireplace two picks that 'dug the men out of the Magpie Drift.'

No. 10.

They have many burrows in the bank, and in the low bushes you may happen on one of their old nests, not greatly unlike a small bird's nest, built wholly of grass, with a deep hollow within. And yonder, along the level branches of the hedgerow, a mouse even now is scampering, a small, well-rounded figure, with prodigious length of tail behind him. Well is it for him that the light patter of his tiny footsteps does not reach the ears of the shaggy white terrier that lies dreaming, with his nose between his paws.

STANDARDS VI. & VII.

No. 1.

Lastly, who of us that live here has not had experience of what I have heard described as the Japanese habit of saying Yes when they ought to say No? You ask your guest, 'Will you not take some more wine?' or say to your friend in the street, interrogatively, 'I suppose there will be no more rain to-day?' In both cases he answers in the affirmative. He will not take more wine, and he agrees with you about the weather prospects. The Englishman, in both cases, would say No. The question is, Which is correct?

No. 2.

The workmen rushed into the streets and those on the lower floors escaped, but a number who were working on the third storey were crushed by the falling timbers, one man being killed on the spot and buried beneath a mass of brick and other material. Ambulances were at once summoned, and the injured, to the number of 12, were conveyed to the hospital. Ten of the men are Italians, one of whom is in a hopeless condition. The broken wall, which was 1ft. thick, is said to have been too freshly built to stand the strain of the high wind prevailing to-day with the weight of the timbers and girders.

No. 3.

Owing to the fortunate circumstance that a trader was acquainted with English, it has been possible to obtain some information from the three sailors saved. The story of the men themselves was somewhat vague, all of them being in a weak condition from the effect of the injuries they sustained when swimming ashore. They state that the Serpent was going full steam ahead when suddenly she struck on the Reef. She sank almost instantaneously. The three sailors themselves were on the upper deck, and the violent shock caused by the ship striking hurled them into the sea.

No. 4.

Seven other persons were in the compartment next to the engine, so that there was only a thin plank between us and the tender. I asked why a brake was not attached to the engine, but got no reply to my question, and we were hurried off. We arrived safely, but the inevitable noise of railway travelling was most uncomfortably increased by our closeness to the clank of the engine and the creaking of the iron buffers of the tender, and I felt that if any sudden stoppage of the train took place the ponderous tender would simply crash through our carriage and send us to our doom.

No. 5.

Our trained nest-rifler will go with a couple of assistants to Shetland; he will have boat and rope ladders; he will paddle from morning to night among the creeks and inlets, will mark the woodcock and the dotterel in their shy retreats, and invade the puffins and the gulls in their nesting colonies. For fifty or sixty days he will be at work, netting, according to programme, five hundred eggs a day or more. Then will come the blowing and the packing, done in the most scientific way; and the parcel post itself, latest resource of civilisation, will be pressed into the service and will carry the 'beautiful and rare varieties' home to the midland collectors.

No. 6.

He illustrated the utility of birds in many happy ways; and the other argument he enforced by showing that 'the craft of man had increased in a much greater proportion than the birds' resources of defence.' If he had foreseen the existence of the oologist and his machinery he would have spoken more emphatically still. We can picture to ourselves this individual, with keen professional eyes and an active body; one of those crafty sportsmen that Nature mysteriously fashions best in the heart of great cities, like the anglers of the Lea river—men from Shoreditch and Hackney, and the most skilful fishermen, in their own line, in the world.

No. 7.

It speaks well for the discipline of the crew that the three survivors agree in stating that the strictest order prevailed during this trying time. The commander, who was on the bridge with the navigating officer and the officer of the watch, gave the order to stand by the boats. An attempt was made to lower them, but they were stove in, and several lives were lost. He then ordered everything which would float to be cut loose, then for the men to take to the rigging, and, finally, for every man to do the best for himself; and it was not until that order was given that the men began to jump overboard.

No. 8.

The merlin and the short-eared owl, the rock-pipit and the wheatear, the dunlin and the sandpiper, are alike in danger. So is the woodcock itself, for nothing is sacred to this poacher with the Greek name. All the tribe of waterfowl which frequent those lonely islands must give up their eggs to Birmingham. The puffin, and the great gull, which is said to have found a last refuge on this island, have been marked down by this rapacious trading company that pretends to the name of naturalists; and the rarer the bird the more eagerly will it be sought out, and the more completely will its nest be rifled.

No. 9.

The plan is extremely simple; and if it is carried out it will doubtless result in the collection of a large number of 'beautiful and interesting objects.' It will result in the robbing of the nests of pretty nearly all the varieties mentioned in the list annexed to the 'Naturalists'' appeal, from the white-tailed eagle to the skylark and snow-bunting. The birds which go to the mild and even climate of the Shetlands for the breeding season must take heed—if that will do them any good, poor things!—for the Birmingham 'zoologist' is on their track.

No. 10.

There is practically no addition to the meagre sum of our information about the loss of the Serpent and her ill-fated crew. Conjecture is busy with the catastrophe, and several plausible theories have been constructed to account for it, but there is no certain knowledge and from the conditions of the case it is exceedingly doubtful whether any will be procurable. None of the three survivors occupied a position which could give him any exact knowledge of the course steered, or the views of those responsible for the navigation of the vessel.

No. 11.

We must not, of course, leave out of account the liability to error on the part of a signalman which may now and then defeat the best rules which can be devised; but recent occurrences point only too plainly towards a neglect which must have been winked at by persons in authority, and which seems to require the strong arm of the law. If the block system, as experts generally admit, is essential to the safe working of a railway system so complicated and so crowded as ours, all failures to maintain that system should render those who are really responsible for them liable to severe punishment.

No. 12.

During the naval manœuvres she sprung a leak, which, though not apparently of a serious kind, ought not to have been possible in a new vessel exposed to no particular strain. Vessels of the class to which she belonged have been reported upon in distinctly unfavourable terms, as being 'crank,' having too much weight forward, and consequently pitching heavily even in a moderate sea. It does not appear that anything was done to remedy these defects, which may not be wholly unconnected with the melancholy loss of life and property we now have to deplore.

PUBLICATIONS REVIEWED.

A School-Bank Manual. By Agnes Lambert London: Cassell and Company, Limited.

Now that parents of children attending elementary schools are to so large an extent relieved from the payment of school fees, many well-wishers of the poorer classes have thought the time very opportune for inculcating and fostering habits of thrift by encouraging the establishment and extension of school banks, where children may deposit small sums such as the pence hitherto paid as school fees. Steps to carry out this idea have already been taken in many towns, and with promise of good results. If it could be successfully carried out generally, so that a large proportion of the amount of fees abolished could be placed in the savings banks to the credit of the children, the result would undoubtedly be of considerable advantage to the community.

The little book before us, though not written to meet the present circumstances, will be found extremely suggestive and useful to school managers and teachers who wish to start banks in connection with their schools. If the statistics in the historical part of the manual were brought down to the current year they would no doubt show a considerable advance on 1885; but still we fear the figures for London schools will compare poorly with those for Manchester, Liverpool and Birmingham.

We heartily commend the book and its suggestions to those interested in social progress.

Dr. Beach's Entertaining Readers for Standards III. and IV. London: Joseph Hughes and Co.

The compiler of this series starts with the well-founded opinion that to teach children to read intelligently and in a short time we must place before them matter that will interest them. He has found from experience 'that Standard III. is just the right period for fairy lore.' Hence the third Reader consists largely of fairy stories. Many of these strike us as remarkably fresh and amusing. The longer ones are subdivided into lessons, and so help to stimulate a continuous interest in the reading. The poetry is abundant and well-chosen, several of the pieces being very suitable for committing to memory, such as Tennyson's 'Death of the Old Year,' Longfellow's 'Reaper and the Flowers,' Browning's 'Pied Piper of Hamelin,' and Mrs. Howitt's 'Fairies of the Caldon Low.' Those to whom the last is familiar may, however, wonder why the spelling of the title should be altered, and regret the insertion of special local names. There are two good reading lessons in grammar, but we do not think the use of such a sentence as 'Do it like I do it,' on page 66, should be encouraged.

The Reader for Standard IV. is quite up to the level of its predecessors. It contains such stories as Rip Van Winkle, Christian and Giant Despair, Sledge Travelling in Russia, and a series of interesting 'Leaves from an Australian Diary,' adapted from the diary of one of the author's old scholars who emigrated. The poetry includes Mr. Arnold's 'Forsaken Merman,' the ballad of 'Brave Lord Willoughby,' such lyrics as 'The Sands o' Dee,' 'The Three Fishers,' 'The Bay of Biscay,' and several fresh pieces. There are also lessons made up of proverbs, jests, guesses, literary extracts from the Bible, and stories of cats and other animals. Much credit is due to Miss Bradley for her original and amusing illustrations.

Both volumes thoroughly justify their claim to the title, Entertaining Readers, and with the advantages of good paper, clear type, and tasteful binding, they cannot fail to be general favourites wherever they may be adopted.

Chambers's New Historical Readers: Standards III., IV., V. London and Edinburgh: W. and R. Chambers.

The series, of which these are the first three numbers, is issued to meet the requirements of the New Code where History is taught as a class subject. The first book consists of twelve simple stories, based on the history of our land from the earliest times to the Battle of Hastings. The book for Standard IV. includes twenty stories and Biographies, beginning with Hereward the Wake, and ending with Caxton, the first English Printer. The volume for Standard V. contains sixty lessons on the persons and events of the Tudor Period. The matter of the lessons is in each case carefully and judiciously selected. The style is simple, pleasing, and suitably graduated. Short poems on the subjects treated are interspersed in each book. Portraits and other wood-cuts add to the interest. After a close examination of these volumes we feel fully justified in recommending their adoption by any teachers in search of a new set of historical readers likely to prove entertaining to the children and effective as means of teaching reading.

Chambers's New Geographical Readers: Book V.—Europe. London and Edinburgh: W. and R. Chambers, Limited.

This is a good volume of a practical series of reading-books. The matter is well-chosen and clearly presented. The descriptive chapters are made very interesting, and special attention is paid to the manners, customs and employments of the people, and to the industrial and commercial relations of countries. The last ten lessons relate to Latitude, Longitude, Day and Night, the Seasons, and kindred subjects. Neat maps are inserted in the text, which is further adorned by a considerable number of suitable illustrations. At the end of the book the facts are summarised in revision lessons, and the difficult words of the various lessons, divided into syllables and properly accentuated, are printed in spelling-lists.

—o—

QUERY COLUMN.

Arithmetic.

ANXIOUS.—Simplify

$$\frac{(\frac{1}{2}+\frac{1}{3})(\frac{1}{2}+\frac{1}{6})}{(\frac{1}{2}-\frac{1}{3})(\frac{1}{2}-\frac{1}{6})}+\frac{(\frac{1}{3}+\frac{1}{4})(\frac{1}{3}+\frac{1}{6})}{(\frac{1}{3}-\frac{1}{2})(\frac{1}{3}-\frac{1}{4})}+\frac{(\frac{1}{4}+\frac{1}{3})(\frac{1}{4}+\frac{1}{6})}{(\frac{1}{4}-\frac{1}{2})(\frac{1}{4}-\frac{1}{6})}$$

—(Evans' "Arithmetic.")

$$\frac{(\frac{1}{2}+\frac{1}{3})(\frac{1}{2}+\frac{1}{6})}{(\frac{1}{2}-\frac{1}{3})(\frac{1}{2}-\frac{1}{6})}+\frac{(\frac{1}{3}+\frac{1}{4})(\frac{1}{3}+\frac{1}{6})}{(\frac{1}{3}-\frac{1}{2})(\frac{1}{3}-\frac{1}{4})}+\frac{(\frac{1}{4}+\frac{1}{3})(\frac{1}{4}+\frac{1}{6})}{(\frac{1}{4}-\frac{1}{2})(\frac{1}{4}-\frac{1}{6})}$$

$$=\frac{\frac{7}{10}\times\frac{3}{3}}{\frac{1}{6}\times\frac{1}{4}}+\frac{\frac{8}{15}\,4\times\frac{1}{3}}{\frac{1}{6}\times\frac{1}{12}}+\frac{\frac{5}{12}\,4\times\frac{6}{20}\,3}{\frac{1}{4}\times\frac{1}{12}}$$

$$=\frac{\frac{7}{10}\,5}{\frac{1}{24}\,8}-\frac{\frac{4}{15}\,5}{\frac{1}{12}\,24}+\frac{\frac{3}{10}}{\frac{1}{48}\,3}$$

$$=\frac{56}{5}-\frac{96}{5}+9$$

$$=11\tfrac{1}{5}-19\tfrac{1}{5}+9$$

$$=20\tfrac{1}{5}-19\tfrac{1}{5}$$

$$=\underline{1}\text{ Ans.}$$

Algebra.

R. U. I.—Solve—

(1) $(a^2-b^2)x^2-(a^2+2ab-b^2)x+ab=0$

(2) $x^3-x^2-x=\frac{27}{8}-\frac{9}{4}-\frac{3}{2}$

—(Royal University of Ireland, 1st Arts, 1889.)

(1) $(a^2-b^2)x^2-(a^2+2ab-b^2)x+ab=0$

$$x^2-\frac{a^2+2ab-b^2}{a^2-b^2}x=-\frac{ab}{a^2-b^2}$$

$$x^2-\frac{a^2+2ab-b^2}{a^2-b^2}x+\left\{\frac{a^2+2ab-b^2}{2(a^2-b^2)}\right\}^2$$

$$=\frac{a^4+4a^3b+2a^2b^2-4ab^3+b^4}{4(a^2-b^2)^2}-\frac{ab}{a^2-b^2}$$

$$=\frac{a^4+4a^3b+2a^2b^2-4ab^3+b^4-4a^3b+4ab^3}{4(a^2-b^2)^2}$$

$$=\frac{a^4+2a^2b^2+b^4}{4(a^2-b^2)^2}$$

$$x-\frac{a^2+2ab-b^2}{2(a^2-b^2)}=\pm\frac{a^2+b^2}{2(a^2-b^2)}$$

$$\therefore x=\frac{a^2+2ab-b^2\pm(a^2+b^2)}{2(a^2-b^2)}$$

$$=\frac{2a^2+2ab}{2(a^2-b^2)}\text{ or }\frac{2ab-2b^2}{2(a^2-b^2)}$$

$$=\frac{a(a+b)}{a^2-b^2}\text{ or }\frac{b(a-b)}{a^2-b^2}$$

$$=\underline{\frac{a}{a-b}\text{ or }\frac{b}{a+b}}.$$

(2) $x^3-x^2-x=\frac{27}{8}-\frac{9}{4}-\frac{3}{2}$;

It is evident that $x=\frac{3}{2}$ satisfies the equation, as then x^2 would equal $\frac{9}{4}$ and x^3 would equal $\frac{27}{8}$.

$$x^3-x^2-x=\frac{27-18-12}{8}=-\frac{3}{8}$$

$$x^3-x^2-x+\tfrac{3}{8}=0$$

And therefore $x-\frac{3}{2}$ must be a factor, as $\frac{3}{2}$ is a root.

$$x-\tfrac{3}{2}\;\Big)\;x^3-x^2-x+\tfrac{3}{8}\;\Big(x^2+\tfrac{x}{2}-\tfrac{1}{4}$$

$$x^3-\tfrac{3x^2}{2}$$

$$\tfrac{x^2}{2}-x$$

$$\tfrac{x^2}{2}-\tfrac{3x}{4}$$

$$-\tfrac{x}{4}+\tfrac{3}{8}$$

$$-\tfrac{x}{4}+\tfrac{3}{8}$$

$$\therefore (x-\tfrac{3}{2})(x^2+\tfrac{x}{2}-\tfrac{1}{4})=0$$

Wherefore—

$$x^2+\tfrac{x}{2}-\tfrac{1}{4}=0$$

$$x^2+\tfrac{x}{2}=\tfrac{1}{4}$$

$$x^2+\tfrac{x}{2}+(\tfrac{1}{4})^2=\tfrac{1}{4}+\tfrac{1}{16}$$

$$=\tfrac{5}{16}$$

$$x+\tfrac{1}{4}=\frac{\pm\sqrt{5}}{4}$$

$$\therefore x=\frac{\pm\sqrt{5}-1}{4}$$

$$\therefore x=\tfrac{3}{2}\text{ or }\frac{\pm\sqrt{5}-1}{4}.$$

—o—

ERROR PRIZE.—The first to point out an error in our October Supplement was Miss E. Welpton, 22, Norwood Terrace, Victoria Road, Headingley, Leeds, to whom a cheque for half-a-guinea has been sent. Our supplement for December will be a complete set of Test Cards for Standard VI., and half-a-guinea will be paid to the teacher who is the first to point out any inaccuracy in the answers.

SCIENCE NOTES.

THE VIRUS OF RABIES.—Some interesting experiments recently communicated by M. Jobert to the Académie des Sciences, Paris, prove that the virus of rabies is not destroyed by severe cold. A rabbit which died of hydrophobia was kept for ten months in a cold chamber of the Popp factory at a temperature of from 10deg. to 20deg. Centigrade, and even for a time at a temperature of 27deg. Centigrade, without destroying the virulence of the germs.

∴

A LIGHTNING PREDICTOR.—The electric state of the atmosphere is measured at the Clark University, Worcester, Massachusetts, by an electrometer and a Thomson water-dropping collector, the results being registered as a curve on photographic paper. This collector is simply an insulated vessel of water from which a fine jet flows into the air. The water where the jet breaks into spray acquires the same electric condition as the air at that point, and this is registered by the electrometer. The water jet acts as a lightning predictor, foretelling the coming flash. Before the flash the jet is seen to twist and split up; after the flash, it resumes its even appearance.

∴

THE OBSERVATORY ON MONT BLANC.—A tunnel large enough for one man to pass along has already been bored horizontally through Mont Blanc, from north to south, a distance of 80 metres, at a vertical distance of 12 metres from the summit. For the present no more work is contemplated.

∴

THE DYNAMIC POWER OF COAL.—Professor Rogers, of Washington, has recently made some curious and interesting calculations as to the dynamic power of coal. He is of opinion that a single pound of good steam coal has within it dynamic power equivalent to the work of one man for one day. Three tons of the same coal represent a man's labour for twenty years, and one square mile of a seam of coal, having a depth of only four feet, represents as much work as a million men can do in twenty years.

∴

ATMOSPHERIC ELECTRICITY.—An interesting experiment has recently been carried out by Mr. Alexander McAdie at the Blue Hill Observatory. A kite, high in the air in a cloudless sky, discharged sparks from the lower end of an insulating wire reaching down to the earth, where an electrometer partly measured the increasing electric force. By merely looking at the needle of the electrometer Mr. McAdie was able to determine whether the kite was rising or falling, so nearly did the quantity of electricity in the upper air correspond to the height of the kite above the earth.

∴

MOVEMENT OF STORMS.—From the meteorological observations reported to the United States Weather Bureau, it appears that the progressive movement of storms in the United States is at the average rate of 25 miles an hour from June to September, 29 miles in October, 30 miles in November, 35 miles in December, and 38 miles in January and February. This is the highest limit. In March the rate of movement is 33 miles, and in April and May 26 miles.

∴

A NEW MARSUPIAL.—The new Marsupial mole, recently discovered in Australia, forms an interesting addition to the fauna of that continent. It burrows by aid of its conical snout, which is protected by a heavy shield, and by aid of its powerful scoop-like fore-claws. With its hind limbs it throws the sand backwards, and as this débris falls in behind it, this mole leaves no record of its burrowings. A drawing of the new animal may be seen at the library of the Zoological Society of London.

∴

THE BACILLI OF CONSUMPTION.—Dr. Cornet, a colleague of Dr. Koch, at the Imperial Sanitary Institute at Berlin, has discovered that the tubercle bacilli—the infective matter of consumption—which reach the lungs through the inhalation of air in which the bacilli are diffused, come almost exclusively from the dried sputum of consumptive persons. The consumptive germ retains its virulence for at least six months, and the real cause of phthisis running in families, Dr. Cornet thinks, is not heredity, but infection resulting from the breathing of the dust of the dried expectoration of the consumptive patient. If the drying of the expectorated matter be prevented by the use of properly constructed spittoons and other precautionary measures, he is of opinion that the spread of consumption may be checked, and the mortality of hospital nurses be greatly diminished. At present a healthy woman of twenty-four who devotes herself to hospital nursing dies, on an average, twenty-two years sooner than a woman of the same age in the general population.

∴

OIL FROM GRAPE-STONES.—An important industry recently introduced into France is the manufacture of grape-seed oil. It is a limpid pale-green oil, which burns with a clear flame, and without any disagreeable odour. A clear white soap is obtained from it, and from the refuse of the grape-seeds a coarser kind of soft soap is manufactured, which is used in the cleaning of linen on a large scale.

∴

THE GROWTH OF PLANTS.—Considerable interest attaches to Mr. Horace Darwin's apparatus for measuring the rate of growth of plants. A thread, which passes over a light pulley, is attached to the upper end of the plant, and a weight is fastened to the lower end of the thread, so that as the plant rises the weight sinks. The vertical growth of the plant is measured by the amount of the descent of the weight, which is read off by means of a cup micrometer, a small cup of oil placed under the weight, which has a needle point fastened to it. The exact position of the needle point is the index by which the scale is read, and it is fixed by raising the cup by aid of a micrometer screw till the needle point touches the surface of the oil.

∴

THE GLACIAL PERIOD.—Mr. N. S. Shaler, in a recent paper, controverts the generally accepted view that the end of the glacial period was probably not very remote from our own day. From the distribution of the vegetation, which in America has regained possession of the glaciated district, he argues that the last glacial period terminated more than twenty thousand years ago. The black walnut and the pignut hickory, between Western Minnesota and the Atlantic coast, have advanced, on the average, a distance of 400 miles north of the ancient ice front, to which their ancestors were driven. Allowing for every conceivable mode of transportation, Mr. Shaler thinks the present distribution of these large-seeded trees cannot have been accomplished in the time generally assigned for their advance. Their implantation might be regarded as due to chance action if they occurred only sporadically in the northernmost part of the district they occupy. But since they extend from Minnesota to the Atlantic, the advance must have resulted from general and continuous causes.

∴

BEES AND CLOVER.—The honey of the Malta bees, which is so much esteemed for its purity and flavour, is dependent for much of its excellence on the extensive crops of clover which are annually raised in the island. To collect one pound of honey, it is estimated that 62,000 heads of clover must be deprived of their nectar, and 3,750,000 visits made by the bees.

∴

A NEW INDUSTRY.—At Dookie, in Australia, the culture of the olive is now being pursued with considerable success. Seven hundred olive trees planted in that district are reported to produce oil of an excellent quality, for which a market is readily found. Apart from the manufacture of oil, the culture of the olive is found to be remunerative, the berries forming a valuable food for pigs. At Dookie the pigs that were allowed to eat up the fallen berries in the olive grove had no other food for upwards of two months, at the end of which time they were in excellent condition.

∴

PETROLEUM ENGINES.—It is possible that the threatened exhaustion of our coal-fields may be indefinitely postponed by the use of petroleum, or other hydro-carbons, as a source of motive power. A pair of petroleum engines recently fitted into a small launch is said to have answered well; and several important engineering firms are now taking up the manufacture of this description of motor. Petroleum engines work on the same general principle as gas engines, but hitherto the clogging of parts has presented considerable difficulty. Much remains to be done before heat energy can be generated in the place where it has to be used.

Owing to the great pressure on our space this month we are compelled to hold over several contributions, as well as many Reviews, till our next issue.

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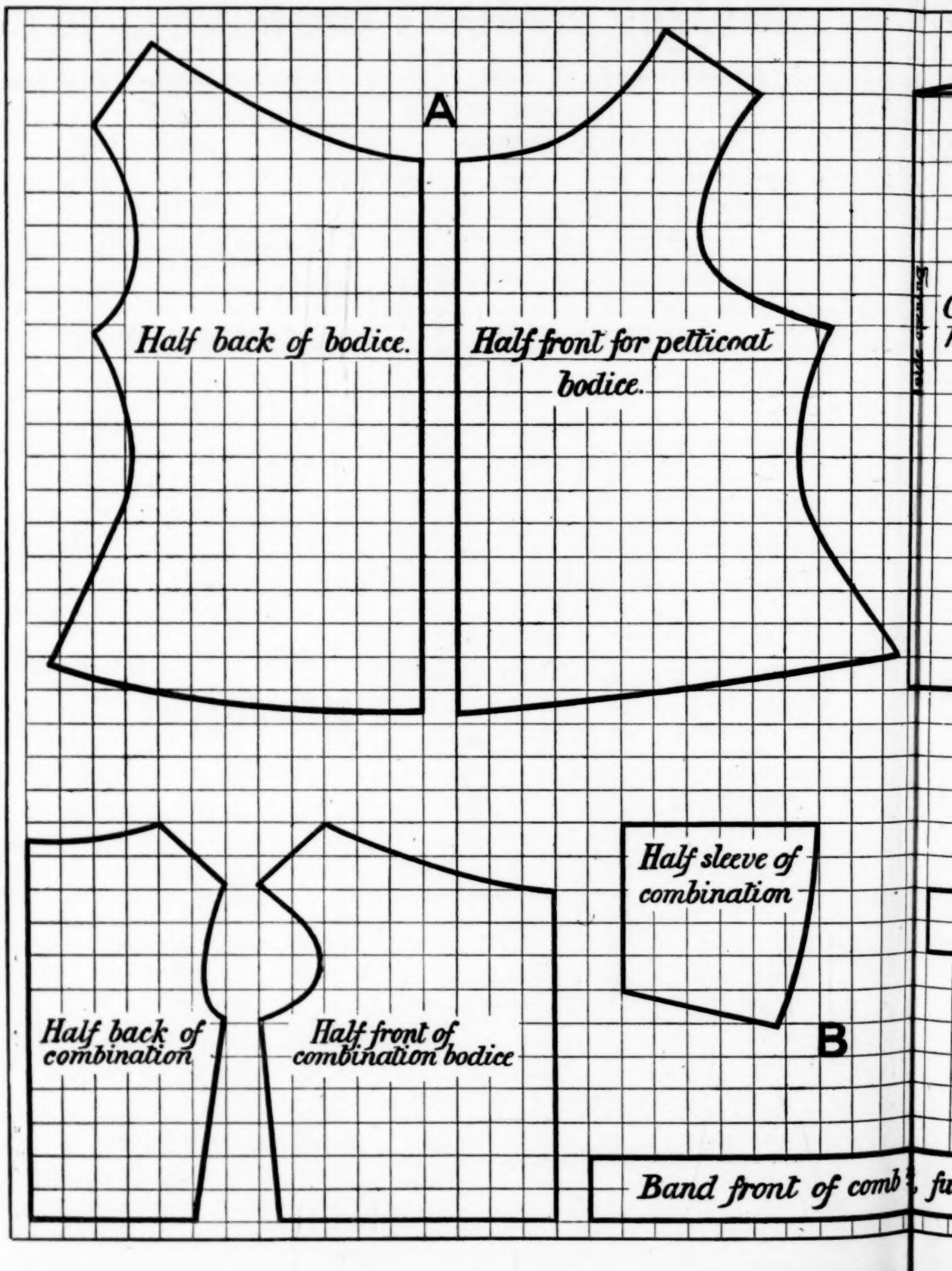

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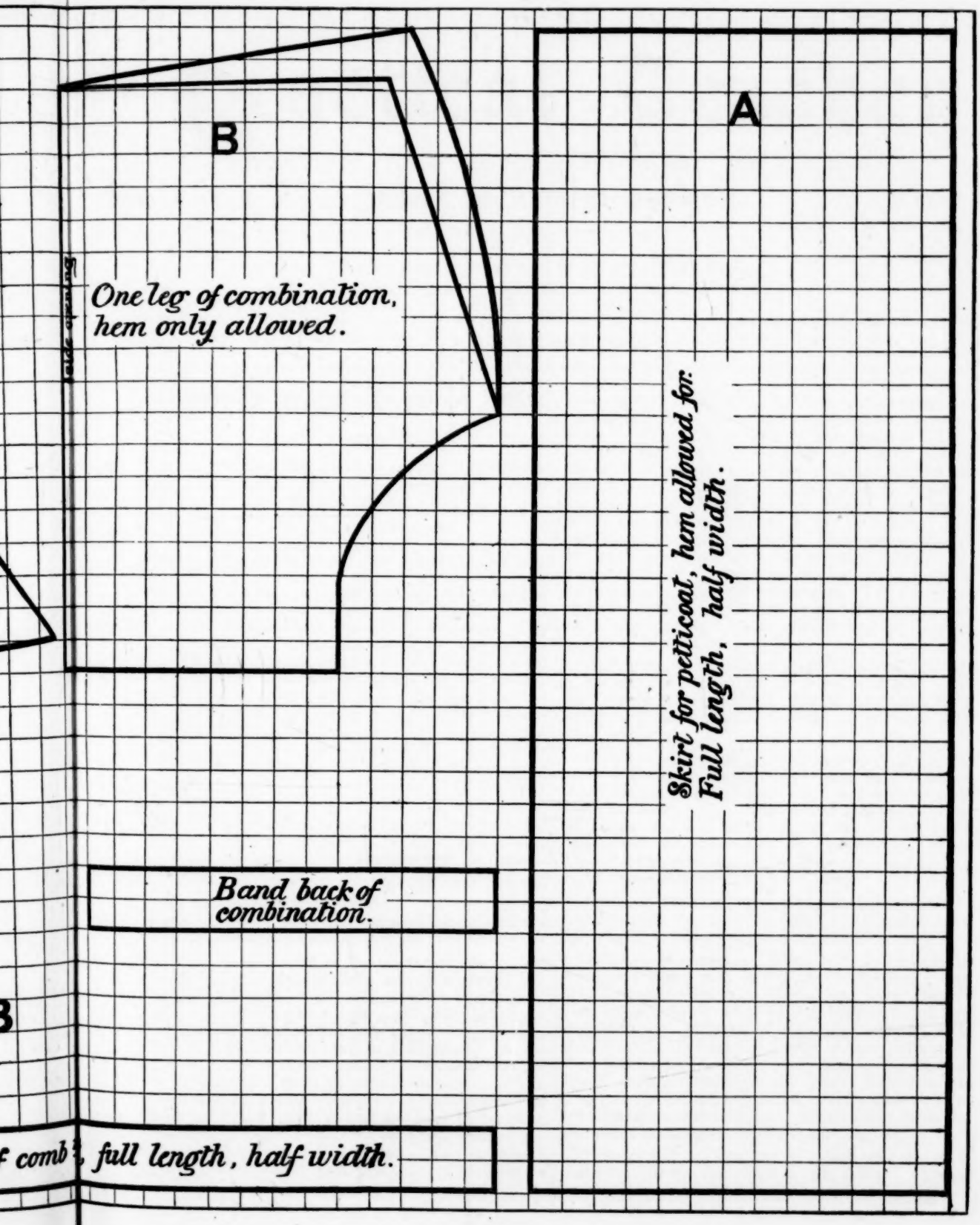
B
One leg of combination, hem only allowed.
A
Skirt for petticoat, hem allowed for. Full length, half width.
Band back of combination.
full length, half width.